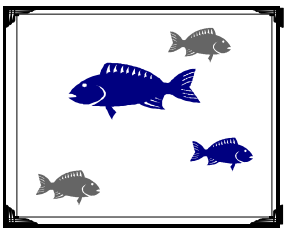
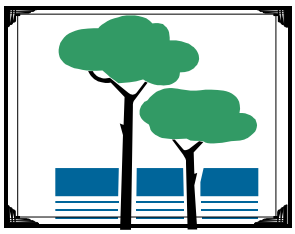
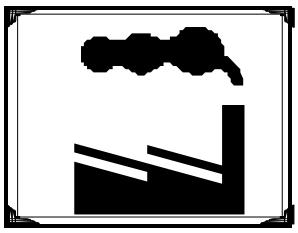
Columbus Community Health Assessment Series: Number 16

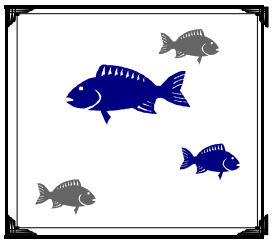
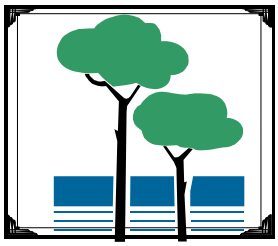
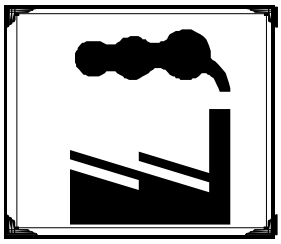
2001 ENVIRONMENTAL SNAPSHOT

Columbus Health Department

December 2001

2001 ENVIRONMENTAL SNAPSHOT

"Working to make Columbus the Healthiest City in America"
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Columbus Health Department

Michael B. Coleman, Mayor

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EXECUTIVE SUMMARY

Columbus and Franklin County continue to undergo significant physical change, which benefits many who live and work in this area. However, this change can be a source of concern --- particularly as it affects the Central Ohio environment.

Continued growth and development place a tremendous burden on our environment, resulting in more resources used and more pollutants being produced. It also means that government faces increasing pressure to enact various controls to protect the environment, community health and quality of life.

Our progress and the success of our efforts is sometimes difficult to gauge. Many obvious environmental problems have been reduced; however, other difficult and complex issues remain to be addressed. At the same time, the public continues to identify the environment as a major area of concern. Community leaders must try and use a variety of tools to assess and inform the public of environmental conditions, and to evaluate the success of environmental initiatives.

The ***Environmental Snapshot***, developed by the Columbus Health Department, was first published in 1997 to help meet the environmental demands of both public officials and private citizens. The 2000 edition is a collection of key environmental indicators which provides a profile of the state of the local environment. This profile, and the trend information it contains, can be valuable both as an educational resource and a means of gauging the success of past environmental efforts.

A comprehensive community process was developed to select the indicators contained in the *Environmental Snapshot*. Government personnel, environmental scientists and members of the general public served as advisors in creating the document. Their participation helped ensure that the most technically relevant and easily understandable indicators would be used. The indicators contained in the *Snapshot* are by no means exhaustive, but they do provide important environmental information in a fairly comprehensive format.

Environmental information is important because it provides an indication of the health of the natural world. It also gives us an idea of potential threats to human health. At the same time, risk from environmental pollution is a product of many different factors, and the presence of pollutants, may not, in itself, constitute a health risk. Conclusions about health risks should not be drawn from information presented in this document. However, *Snapshot* data are useful in providing a relative idea of environmental improvement or deterioration.

Readers should note that much of the *Snapshot* data offer encouraging environmental news and evidence of environmental improvement. However, the document also highlights some areas of environmental concern.

The *Environmental Snapshot* is updated annually. Readers are encouraged to offer suggestions for improving the document's content and/or format.

SUMMARY INFORMATION BY DOCUMENT CATEGORY

Symbols denote a positive **(+)**, negative **(-)**, or mixed **(=)** trend or impact

Urban Conditions

= Continuing sustained growth remains the largest factor impacting the Columbus and Franklin County environment.

= The population of both Columbus and Franklin County continued to grow in 2000.

= The completion of the 2000 census required a technical adjustment in the population figures. The reported 2000 actual census totals show that the population of Columbus throughout the 90's has been growing slightly faster and the population of Franklin County slightly slower than annual population estimates had suggested.

= Over the past decade the growth of incorporated land area has been concentrated in Columbus and outer ring suburban communities. This growth continued in 2000 but at a much slower rate than 1999, the largest annual expansion of newly platted acres during the past decade.

+ The number of tree plantings by the City of Columbus in 2000 posted a new high of 4,798 trees, an increase of 41% over 1999 and for the seventh consecutive year.

= Franklin County land in farms remained unchanged at 102,000 acres. The acreage used has remained nearly the same for the past three years ending a decline in acreage that spanned most of the 1990's.

= New Columbus building construction grew at a robust rate, increasing by more than 7200 new units. The rate of new construction is down modestly from the peak year of 1999.

Air Quality

+ For the most recent reporting year, 1999, Franklin County ambient air sampling data showed decreases in carbon monoxide and particulates.

_ Sulfur dioxide and ozone posted ambient air sampling increases in 1999.

+ Total 1999 toxic chemicals released into the Franklin County air, as measured by The Ohio EPA Toxic Release Inventory, decreased by more than 300,000 pounds in comparison to 1998. This total is 28% of the total pounds of toxic chemical releases reported in 1990.

= The number of passenger vehicles registered in Franklin County rose by more than 2%, an additional 20,800 vehicles. However, estimated vehicle miles traveled per day by Franklin County drivers has remained almost constant throughout the past four years. This was accompanied by modest decreases in vehicle hydrocarbon and nitrogen oxide emissions.

Drinking Water

+ For drinking water treated by the Columbus Division of Water, average annual levels of nitrate, trihalomethanes and atrazine continue to be well below maximum contaminant levels (MCL) established by the Safe Drinking Water Act.

+ Annual averaged nitrate, atrazine and trihalomethane levels are below established MCL levels at all three city water treatment plants. Since regulatory standards for these substances were adopted, no violations have been recorded for trihalomethanes and atrazine.

- During 2000 exceedances of the nitrate MCL occurred at the Dublin Road treatment plant on twenty-three days. During the same period no exceedences occurred at the Hap Cremean or Parsons Avenue treatment plants

+ The 1999 annual averaged atrazine level decreased at two of three city treatment plants, compared to 1999.

Surface Water Data

- Sampling data collected by Ohio EPA's Division of Surface Water shows a degrading of aquatic life use attainment in Franklin County surface waters.

= The sources of impairment to Franklin County surface waters have changed. The percentage of pollution from construction and development sources has increased. These sources have replaced point source pollution and land disposal as the predominant sources of impairment to aquatic life use attainment.

- The percent of river miles supporting all recreational uses decreased markedly since the previous reporting period.

+ Fish tissue analysis data indicate a dramatic improvement in the percent of sampled river miles rated as “slightly/moderately elevated” for contaminants. The percentage previously rated “highly /extremely elevated” was reduced.

Solid Waste Data

- 2000 data shows the amount of solid waste generated in Franklin County increased by more than 8% compared to the previous year, nearly 150,000 tons.

- There was a 28% increase in industrial solid waste generated within Franklin County.

- There was a 4% increase in Franklin County residential/commercial tonnage.

- 2000 municipal waste collected by City of Columbus crews posted an increase of nearly 8% in tonnage compared to the previous year.

+ Columbus recycling increased by more than 12% in 2000. Recycling still only accounted for 4.1% of the total municipal waste collected.

+ The amount of Franklin County waste that was disposed out-of-county decreased by 36% from the previous year.

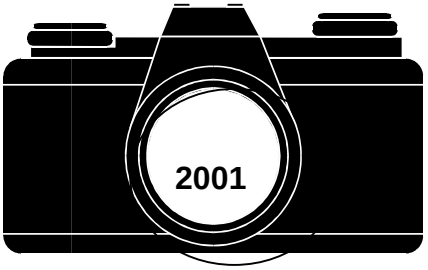


Table of Contents

Listing of Tables and Graphs:

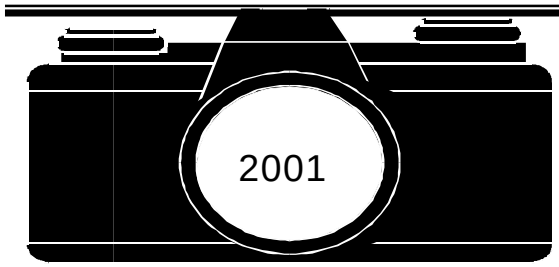
URBAN CONDITIONS

AIR QUALITY

DRINKING WATER

SURFACE WATER

SOLID WASTE



ENVIRONMENTAL SNAPSHOT

DOCUMENT ORIGIN

Columbus and Franklin County are undergoing great change, change that has benefited many who live and work in this area. At the same time, however, this change is a significant source of concern --- particularly as it impacts the Central Ohio environment.

Continued growth and development place a tremendous burden on our environment. More people and development activity mean more resources used and more pollutants produced. It also means that government faces increasing pressure to enact various controls, to protect not only the environment but also community health and quality of life.

Sometimes, the question of whether we're succeeding is debatable. Many of the most obvious sources of environmental pollution have been reduced or largely eliminated since the inception of the U.S. Environmental Protection Agency 30 years ago. As the more obvious forms of pollution have been curtailed, other environmental problems have taken their place. In many ways, these remaining problems are subtle and more complicated, and our progress in addressing them is sometimes harder to measure.

At the same time, the public remains deeply committed to the environment. National and state opinion polls consistently show environmental protection is an important concern. Past city initiatives suggest that the Central Ohio community shares this view. One of these was *Priorities '95,* a two-year project that used community volunteers to identify, analyze and rank the city's most pressing environmental risks, and develop strategies to reduce or eliminate them. The project ended in December 1995 with the development of more than 180 recommendations for environmental improvement. Since that time, the City of Columbus has worked to implement many of the project recommendations.

Over 200 citizens worked directly through *Priorities '95* to produce a comprehensive environmental blueprint for our community. In addition, hundreds of other citizens participated more informally by attending project workshops and open houses, completing project questionnaires, surveys and providing public comment. The project clearly shows the community cares about the environment and is concerned about environmental trends.

Recognizing this, City of Columbus officials searched for new ways to give the public environmental information — an informational tool that could:

1. Be easy to produce,
2. Offer meaningful environmental information in a user-friendly format, and
3. Be updated frequently.

In 1997, the first *Environmental Snapshot* was produced by the Columbus Health Department in an attempt to meet these goals. The document used various indicators to convey information on environmental status and trends in the Franklin County/Columbus area.

WHAT'S AN INDICATOR?

As the name implies, an indicator is a piece of information that provides an indication of environmental health or status. An indicator may also be referred to as a benchmark. Indicators may cover a wide range of information, but as with any group of data, some indicators may be more meaningful than others.

Indicators should be quantitative measures. Quantitative information is often more easily measured and is generally less ambiguous than qualitative measures. There are other important factors to consider in evaluating potential indicators. Among other things, a good indicator should:

1. Be clearly defined, verifiable, easy to produce and scientifically accepted,
2. Measure something important about environmental conditions, and
3. Be clearly linked or relevant to environmental trends or status.

Mercury levels in an area lake, for example, would be a fairly good environmental indicator. This hypothetical indicator is clearly defined, verifiable and relatively easy to measure. Given the toxicity of the chemical, mercury directly affects the health and diversity of the various aquatic organisms living in this environment. Collection of mercury data clearly enables inferences to be made about the environmental health of this habitat and the organisms living there.

On the other hand, the amount of money spent over time to clean up a contaminated lake may not be a good indicator. While this type of information may be clearly defined and easily measured, it does not, in itself, convey something important about environmental conditions. Dollars may be spent on cleanup, but this type of measure cannot address the question of whether the cleanup was successful in removing the environmental hazard or whether the environmental health of the lake significantly improved as a result. This type of measure provides no clear evidence of environmental health, status or trends.

Using indicators as a measure of environmental health is not a new phenomena. Many health and environmental organizations have been using this type of information for years. The American Public Health Association has produced a Public Health Report Card, reporting indicators for a variety of topics, including "Healthy Environment." The United States Department of Health and Human Services, in its 1991 publication *Healthy People 2000*, outlined an expansive number of national objectives to improve the country's health. Many of these objectives (and their associated indicators) were targeted to improve environmental health. However, while the *Snapshot's* subject matter may be comparable to these other publications, the information it contains is very different.

HOW THE INFORMATION IN THIS DOCUMENT WAS SELECTED

To ensure that the most relevant and understandable environmental data would be used, a number of individuals were asked to participate as advisors in developing the original *Snapshot* document. Forty-three persons from various state and local government organizations were initially contacted.

Materials were developed and distributed asking these potential advisors to suggest possible indicators for the general topic areas of *Air Quality, Surface Water, Drinking Water, Solid Waste Management, Urban Sprawl* and *Multi-Media.* Twenty-five persons returned these brainstorming worksheets, submitting a total of 231 possible indicators.

The 231 possibilities were then defined, and three criteria were used to evaluate the strength of each suggestion. The advisors were asked to consider each indicator for:

1. Data Quality -- Is the information collected on an annual basis?
2. Relevance -- Is there a strong link between the information and environmental change, health or status?
3. Understandability -- Can the information be clearly communicated?

Over half of the possible suggestions were dropped when these three criteria were considered. Two other groups were asked to consider the 107 that remained. The first was a volunteer panel of 18 environmental scientists, engineers and educators, which considered the scientific merits of each choice. The second was a public focus group, which met in a daylong session to discuss the strengths or weaknesses of each choice from a non-technical perspective. In the end, the indicators that both groups rated highly with some minor adjustments were chosen for use in the *Snapshot* .

The initial *Snapshot* was published in November 1997. This year's 2001 *Environmental Snapshot* is the fifth edition in the series and presents much of the same indicator information, updated to reflect an additional calendar year of data.

WHAT THE *SNAPSHOT* DOES

This document addresses a number of needs. For the public, it attempts to be a concise, easily understandable and comprehensive source of general environmental information. As an educational tool, it can familiarize readers with some of the different city, county and state organizations responsible for environmental protection and information collection. Perhaps most importantly, information contained in the *Snapshot* may increase environmental awareness both among the public and government officials, and help in the development of new environmental policies.

It must be stressed that the document contains only a fraction of possible environmental indicators. Indicators are nothing more than information; thousands of pieces of environmental information could have been included. In helping to select the information that would be used, the *Snapshot* advisors wanted to:

1. Use relevant information,

2. Use information that is currently being collected by a public agency, and

3. Make the document brief and reader friendly.

Use of advisors in developing the *Snapshot's* contents helped ensure the material is relevant. In some cases, however, some recommended indicators could not be used because the information is not being collected, not being collected in a useable form, or the existence of the information could not be verified. Finally, some potential indicators were dropped because of concerns about data complexity.

WHAT THE INFORMATION MEANS

Environmental information is important because it provides an indication of the health of the natural world. It also gives us an idea of potential threats to human health. Estimates vary and uncertainties exist, but researchers maintain a link exists between human health and environmental health. Noted public health practitioners Drs. J. Michael McGinnis and William Foege have estimated that three percent of the annual deaths in this country may be attributed to "toxic agents," which include "occupational hazards, environmental pollutants, contaminants of food and water supplies and components of commercial by-products." Cancer researchers Doll and Peto have estimated that two percent of all cancer deaths may be attributed to air, water and food pollution.

However, it's important to remember that the presence of pollutants may not, in itself, constitute a health risk. Risk from environmental pollution is a product of many different factors. These include the presence of a pollutant, the toxicity of that substance, the way people are exposed

to the pollutant and the length of time they are exposed. Any of these variables can significantly impact the level of risk to individuals or populations.

For this reason, it's important to guard against drawing conclusions about health risks from the information presented in this document. On its face, the data can only indicate environmental trends. It is useful in providing a relative idea of environmental improvement or deterioration. And, while the information may suggest that more detailed analysis is needed to address potential health concerns, it cannot, by itself, be used to draw conclusions about risk to people's health.

SOME WORDS ON INFORMATION SCOPE

Readers will notice that the document contains a mix of city and county data. While increasing efforts are being made to measure and collect environmental data along regional or ecosystem boundaries, this is not yet a widespread practice. Using information as collected by city, county, state, etc., remains the easiest and most practical way to work with the majority of environmental data. And, in the interest of presenting citizens with the most "local" information possible, the indicators in this document are confined solely to city/county boundaries.

Readers will also notice that *Snapshot* data are presented over varying time frames. These differences are solely a function of an agency's collection practices and data availability. This means that the most current available annual information may or may not be from the preceding calendar year. It may also mean that the most current information may be presented with two, three, or four or more years of historical data, depending on individual agency circumstances and the feasibility of collecting more significant amounts of information.

QUESTIONS? COMMENTS?

This *Snapshot* will be updated annually. Its contents will change as the community requests additional information, new data sources are identified, and/or data collection efforts improve. We welcome comments from readers on the document's format and contents, its usefulness and the possible inclusion of new information. Comments should be directed to:

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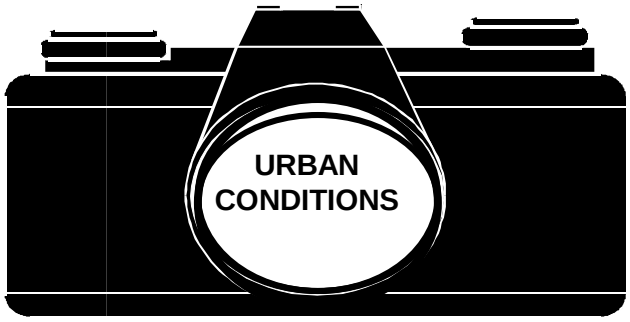
645-7155 (fax)
danaw@cmhmetro.net (e-mail)

Readers may have questions on the meaning of the data in this document. Please note that questions of data interpretation are beyond the capabilities of this document and are not addressed here. Questions of this nature should be directed to the specific agency that supplied the information. These data sources have been noted throughout the document.

I. URBAN CONDITIONS



BACKGROUND

What comes to mind when one mentions “The Environment?” For many, talk of environment conjures up images of the natural world: a snow-capped mountain range, dense forest, rolling green meadows, a shimmering lake or churning river, vast, blue skies filled with crisp, clean air and in all of these settings, an abundance of healthy, diverse plants and wildlife. It’s images and ideas like these that people feel so strongly about protecting.

The reality, however, is that for many, the environment is something quite different. In urban areas especially, the environment may not be a natural setting, but one of human design and construction. In densely populated areas, the notion of the environment may be limited to the constructed world. So, while the idea of environmental protection is clearly an important concept, in an urban setting where many of the natural systems have been permanently altered or eliminated entirely, a more relevant one may be that of environmental change.

What does environmental change mean when considering the urban setting? What does it reflect? One answer is that environmental change can be directly linked to quality of life. Environmental change in an urban setting results in either a positive or negative change in our quality of life. By considering evidence of change, we may be able to draw some conclusions about the quality of life in an urban setting.

Urban change is a continual process, though the degree of change may vary from community to community. Franklin County is in the midst of very rapid urban change. With more than 1 million people, low unemployment, a growing economy and significant development both inside and around Columbus, there is no shortage of urban change examples.

However, it is difficult to select examples that universally reflect change in quality of life. “Quality of Life” is a subjective concept; there is no universal definition. For most of us, our ideas about quality of life are based on emotional responses to a variety of factors in our daily lives. People may have very different ideas about the factors that determine their quality of life, and their emotional responses to these factors can be different, as well.

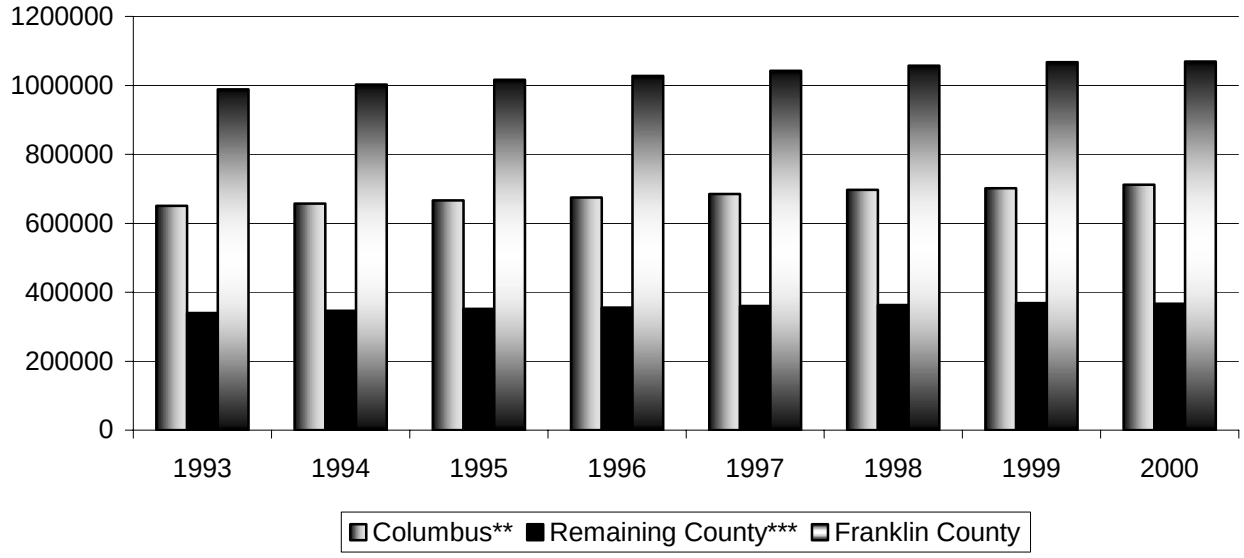
At the most basic level, however, the concept of urban change can be reduced to one common element: people. Changing demographics drives urban change, how people use and develop the land around them. These population changes and the resulting impacts are ultimately key considerations for many of us in forming our opinions about quality of life.

What follows is information relating to people and the impact they have on the urban environment. This information consists of indicators for three general topic areas: population, land use and construction changes. In considering this material, it is important to remember that these indicators represent only the most basic type of information on urban change. Hundreds of other facts could also be highlighted in considering this concept.

It's also important to recognize that as an environmental issue, the urban environment is somewhat unique when compared to topics like Drinking or Surface Water, Solid Waste, and Air Quality. Since urban change and quality of life are subjective concepts, different people may see the desirability and impact of urban change very differently. The information below may offer evidence of urban change. However, the conclusions that can be drawn from this evidence, and the impact of this change on community quality of life, are open to a variety of interpretations.

1) POPULATION

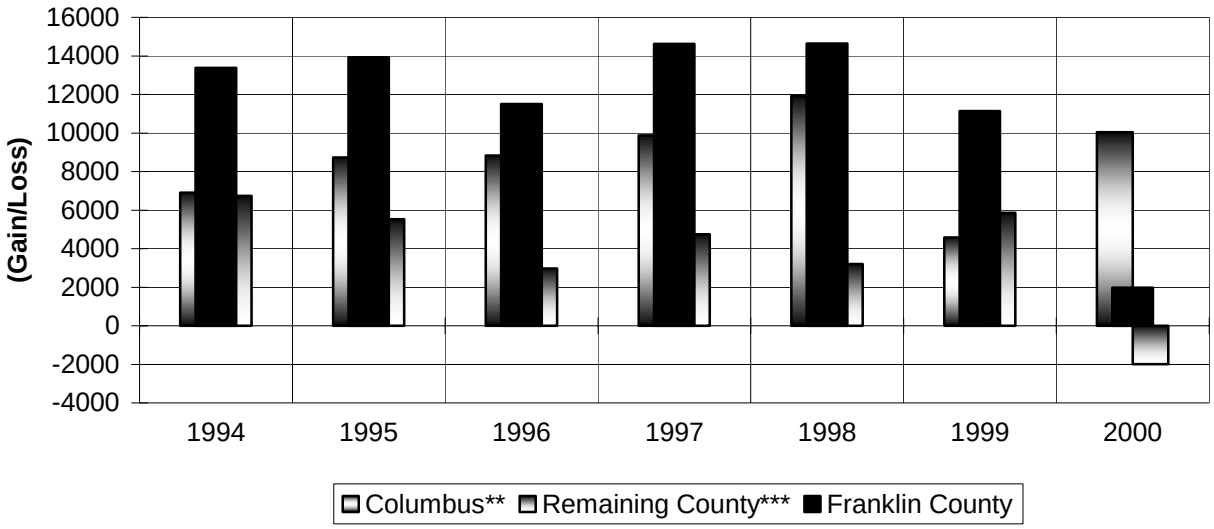
TOTAL POPULATION
1993 – 2000*



Note: **1993-1999 totals reflect estimates. 2000 totals reflect actual data from the 2000 census.*
***Includes totals from outside Franklin County.*
****Includes incorporated, unincorporated areas.*

SOURCE: Mid-Ohio Regional Planning Commission

POPULATION CHANGE
1994-2000*

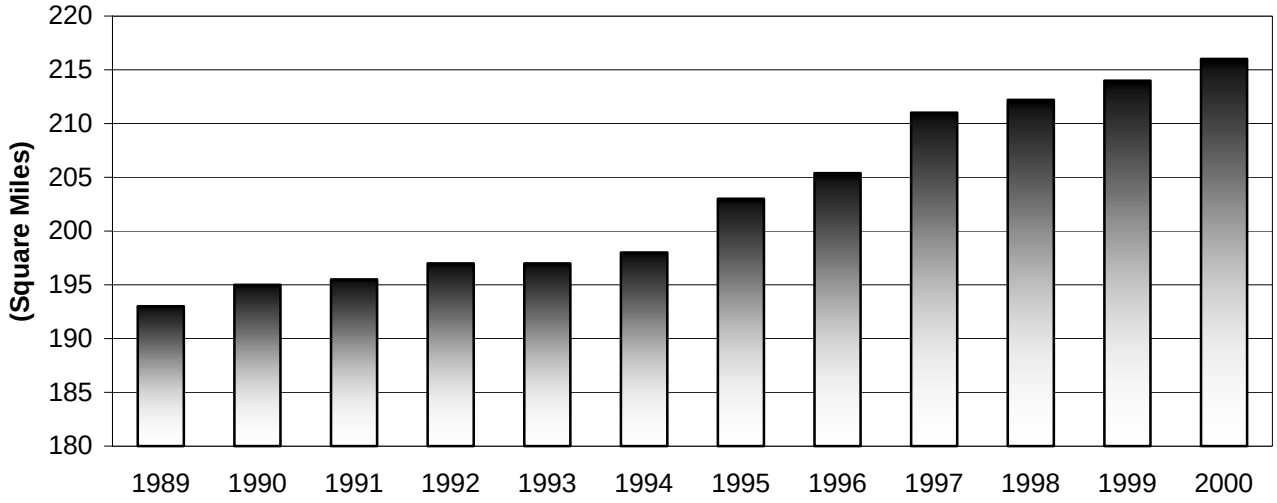


Note: **1994-1999 totals reflect estimates. 2000 totals reflect actual data from the 2000 census.*
***Includes totals from outside Franklin County.*
****Includes incorporated, unincorporated areas.*

SOURCE: Mid-Ohio Regional Planning Commission

2) LAND USE

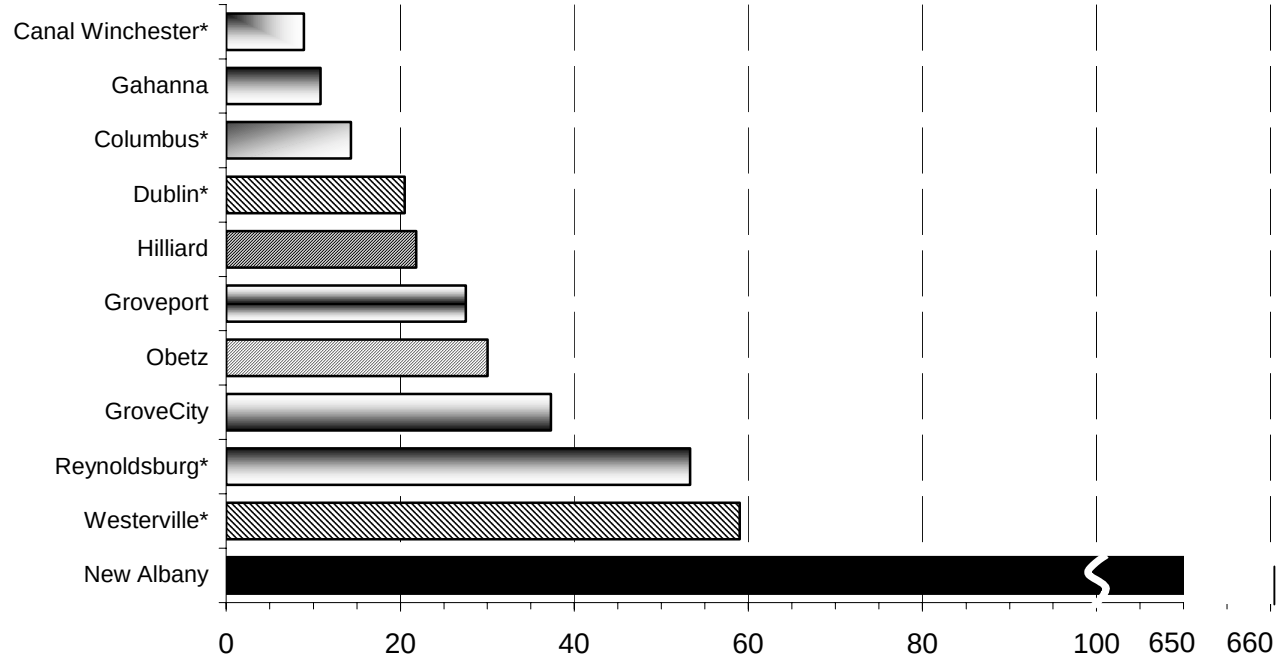
LAND AREA - COLUMBUS ONLY



Note: *Includes incorporated area outside of Franklin County.*

SOURCES: Columbus Department of Trade and Development

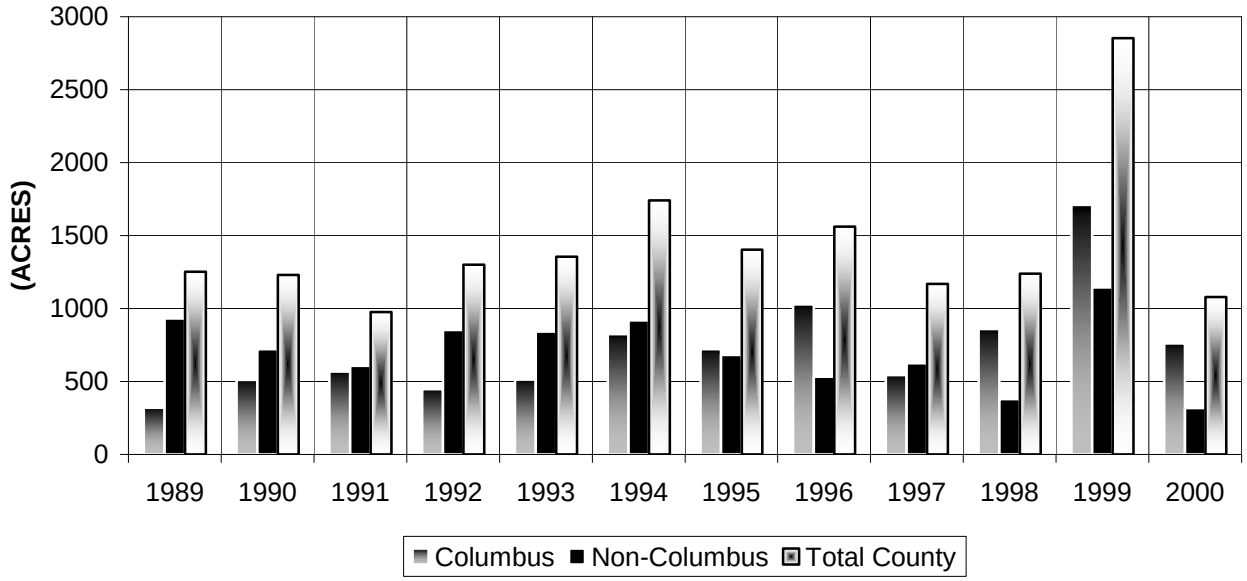
LAND AREA**
Percent Change in Area Since 1989



Note: **Includes area outside of Franklin County.*
***All other Franklin County incorporated communities during the period remained virtually unchanged.*

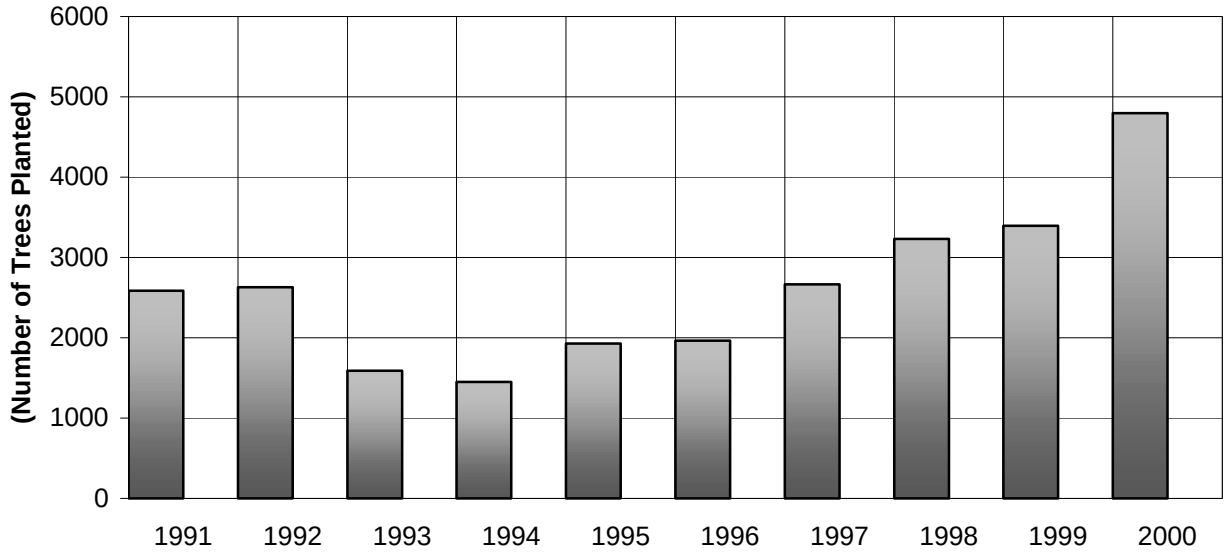
SOURCE: Franklin County Engineer's Office

NEWLY PLATTED LAND
1989 - 2000



SOURCE: Mid Ohio Regional Planning Commission

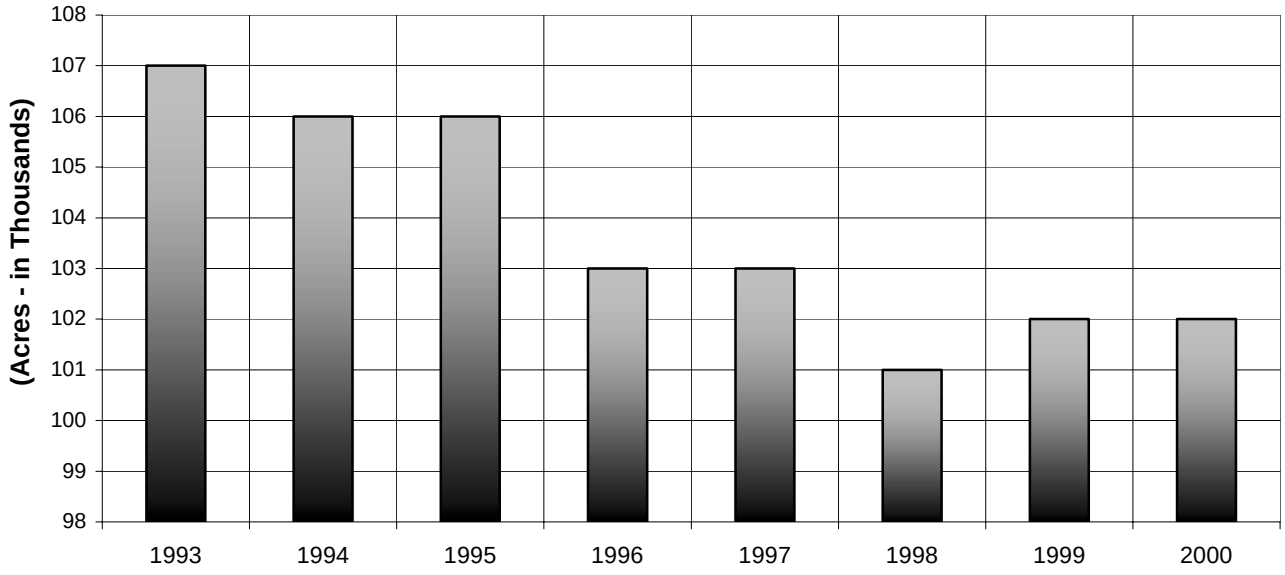
COLUMBUS TREE PLANTINGS



Note: *Recreation and Parks Department program began in downtown area neighborhoods and will work towards the outerbelt.*

SOURCE: Columbus Recreation and Parks Department

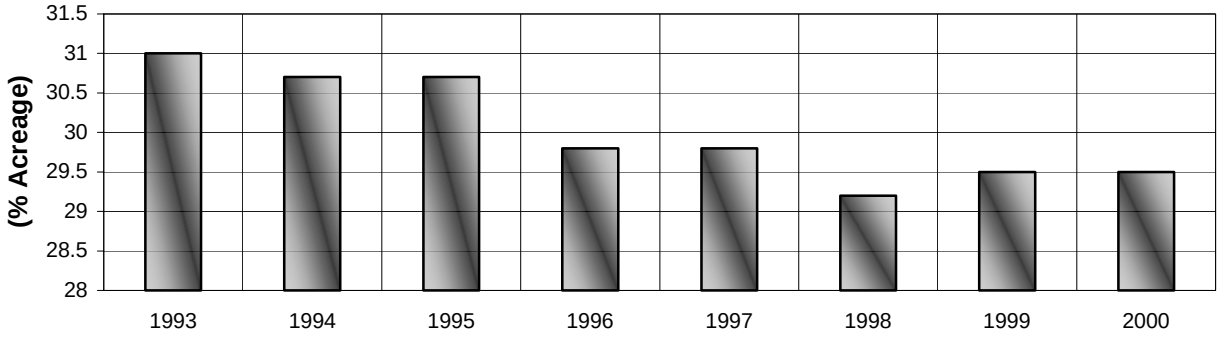
FARMLAND
Franklin County Land in Farms



Note: *Farmland defined as productive land with at least $1,000 in annual agricultural sales or expenses.*

SOURCE: Ohio Agricultural Statistics Service

FRANKLIN COUNTY LAND IN FARMS
(% of Total Acreage)

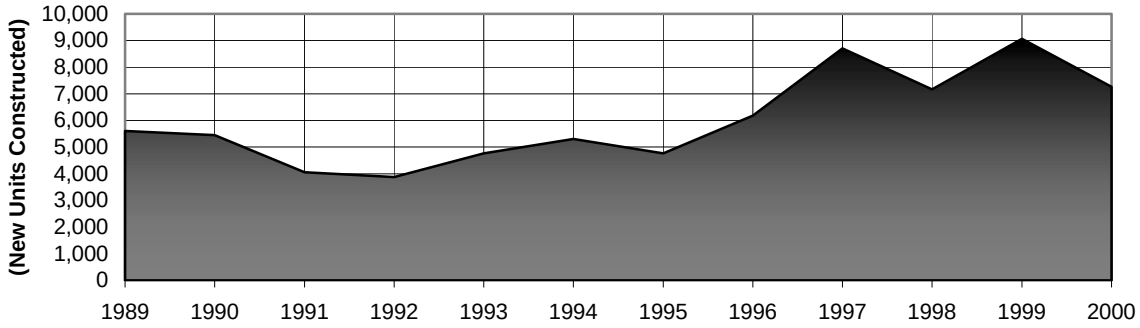


Note: *Farmland defined as productive land with at least $1,000 in annual agricultural sales or expenses*

SOURCE: Ohio Agricultural Statistics Service

3) CONSTRUCTION CHANGES

COLUMBUS BUILDING ACTIVITY



Note: *New construction, excluding residential, commercial additions and alterations, and residential garages*

SOURCE: Columbus Department of Trade and Development

COLUMBUS STREETS AND ROADS

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Number of Miles	1,756.9	1,778.6	1,801.0	1,822.9	1,844.0	1,871.4	1,891.4	1921.3	1944.1
Miles Added	N/A	21.7	22.4	21.9	21.1	27.4	20.0	29.9	22.8

SOURCE: Columbus Public Service Department

II.

BACKGROUND

Our attempts to adapt to nature and develop new products depend on the use of vast amounts of fuel. Although these fuels have allowed for tremendous advances in our society, their use has also created significant problems.

Many of the fuels that power our society are derived from oil or coal, which when burned produce energy. However, burning these materials produces various combustion by-products that are released into the atmosphere as air pollutants. While there are some natural sources of air pollution, (i.e., pollen, dust), by-products of the manufacturing process and incomplete combustion are more commonly contributors to this problem.

Some of the more significant pollutants produced through incomplete combustion include particulate matter (soot, ash and other solids), unburned hydrocarbons, carbon monoxide, sulfur dioxide, various nitrogen oxides, ozone and lead. These substances are often invisible to the eye. In some cases, after chemical reactions with sunlight, they can appear as brown or blue gray haze.

Air pollution can be diffused by wind or removed by rain. However, some portion of the pollution always remains relatively close to its source. It can be trapped close to the Earth's surface due to a variety of factors including weather, the geographical characteristics of the surrounding area, or the nature of the pollutants themselves.

All large cities, given their concentration of people, manufacturing and fuel-burning facilities, have some degree of air pollution. The presence of air pollution means that as we breathe, we take these materials into our bodies. These materials can be damaging if inhaled in sufficient quantities or concentrations.

Of course, the presence of pollutants alone does not automatically result in health damage. Whether or not one’s health is affected depends on a variety of factors. These include the type of material inhaled, the concentration of that material in the air, and the length of our

exposure. However, it is widely accepted that air pollution can be a cause of sickness and premature death, especially for the very young and old, and for people with respiratory ailments, heart, lung and circulatory problems. Asthma, bronchitis and emphysema are three of the many serious health problems that may be caused or aggravated by air pollution.

SOURCES

Air pollution generally comes from two types of sources. Stationary sources are fixed, permanent facilities. When we think of stationary sources we usually think of "smokestack" pollution. Electric power plants and industrial boilers can be significant producers of air pollutants. However, any physical facility releasing pollution into the atmosphere is considered a stationary source.

Mobile sources, as the name implies, are not stationary. When we think of mobile sources, we usually think of "tailpipe" pollution. Mobile sources are divided into two types: road sources (cars and trucks) and non-road sources (mowers, other engines). One of the most significant sources of air pollution in this country is a mobile source --- the automobile engine.

We know how air pollution is produced and from where it comes. What can we say about this problem in and around Franklin County? Is the air quality a cause for concern? Are air quality trends improving or deteriorating?

In trying to answer these questions, some type of information on the amount of smokestack and tailpipe pollution is a good starting point. Once materials are released into the air, the environment quickly acts upon them. So, while it's important to know how much pollution is produced, what remains in the vicinity after wind, rain and other weather patterns act on it, is also an important consideration in determining how healthy our air is. For this reason, this section will present information on pollutants discharged from mobile and stationary sources, as well as data collected from area air monitors.

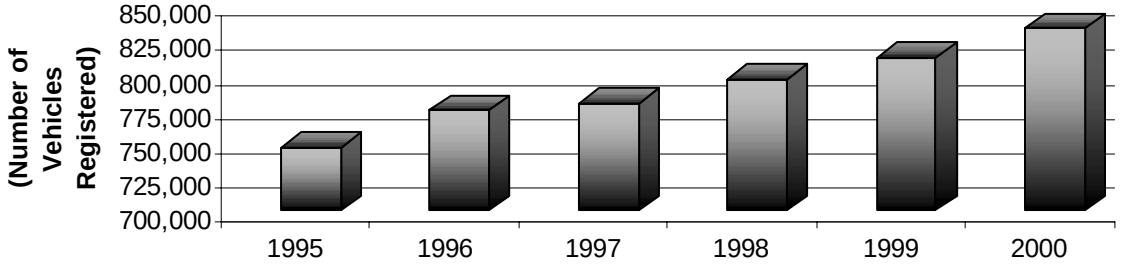
TAILPIPE PRODUCTION

Tailpipe emissions contain a number of chemicals. The most significant may be carbon monoxide, a colorless and odorless gas. Other significant pollutants are the hydrocarbons, which are compounds containing only hydrogen and carbon. Benzene is one such hydrocarbon. Benzene and other hydrocarbons may cause adverse health effects following exposure from inhalation, ingestion, skin or eye contact.

Another group of compounds produced in tailpipe emissions is ***nitrogen oxides,*** such as nitrogen monoxide, nitrogen dioxide, and nitrogen trioxide. Nitrogen monoxide is a smog former and one of the major precursors of acid rain. It changes to nitrogen dioxide in the air. Nitrogen dioxide can affect the body if inhaled or through skin contact. Exposure in sufficient concentrations can cause irritation of the eyes, nose and throat, severe breathing difficulties, and lung damage.

Estimates of hydrocarbons and nitrogen oxides produced by drivers can be calculated given known and estimated transportation information and properties associated with automobile engine operation and efficiency. Using this information, transportation planners from the Mid-Ohio Regional Planning Commission (MORPC) have estimated the amount of hydrocarbons and nitrogen oxides produced annually by Franklin County drivers:

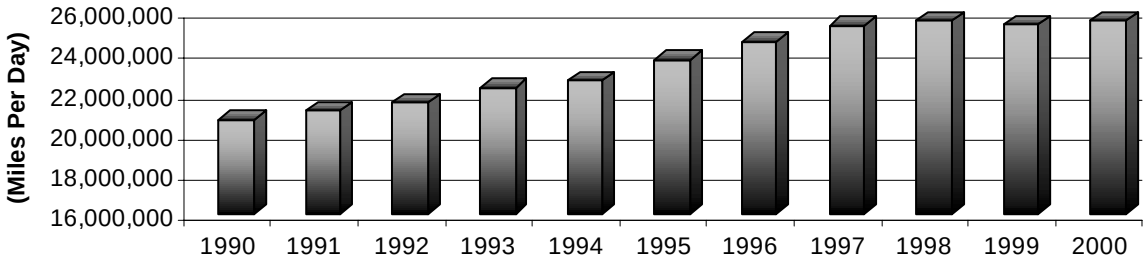
PASSENGER VEHICLES REGISTERED IN FRANKLIN COUNTY



Note: *Motor vehicles designed and used for carrying less than 10 people,including cars, sport utility vehicles, non-commercial trucks and vans.*

SOURCE: Ohio Bureau of Motor Vehicles

FRANKLIN COUNTY VEHICLE MILES TRAVELED



SOURCE: Mid-Ohio Regional Planning Commission

FRANKLIN COUNTY VEHICLE EMISSIONS

(Tons per Day)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Hydrocarbons	54.36	54.00	52.96	53.79	54.39	54.32	53.10	52.52	49.19
Oxides of Nitrogen	51.79	52.11	51.39	52.16	52.39	52.37	51.22	50.88	48.05

SOURCE: Mid-Ohio Regional Planning Commission

SMOKESTACK PRODUCTION

One source of information on the type and amount of material released through area smokestacks is compiled annually in Ohio by the Ohio Environmental Protection Agency in the state's Toxic Release Inventory (TRI). The Emergency Planning and Community Right to Know Act enacted by Congress in 1986 mandates reporting procedures. The law is based on the simple premise that citizens have the right to know about toxic chemicals in their communities.

Under the law, certain manufacturing facilities must report to U.S. EPA and provide the amounts of more than 300 chemicals that are released into the air, water or land, and the amount of chemicals transported to off-site locations. This information must be compiled into an annual inventory and made available to the public. This annual inventory of information makes up the TRI.

Not all facilities are required to report emission totals. The requirement affects only facilities that:

1. Annually produce, import or process 75,000 or more pounds of any of the 328 TRI chemicals, or those that use in any manner 10,000 pounds of a single TRI chemical;
2. Engage in general manufacturing activities; and
3. Employ 10 or more full-time employees.

These facilities must report the amount of listed chemicals that are released directly to air, water or land. In addition, manufacturers must report the amount of material transferred off-site to other facilities that treat or dispose of the chemical wastes. Both routine releases and accidental spills or leaks must be reported. TRI data is not an indication of regulatory violations --- facilities must report even if their releases comply with all applicable environmental laws, permitting and operational requirements.

Many different chemical compounds are formed and released into the air as part of the manufacturing process. Some are inherently more hazardous than others, given their chemical properties. Almost any chemical may be harmful in sufficient concentrations or durations of exposure, but it is important to remember that the TRI simply reports raw totals of released materials. While the document is an indicator of pollution, the reported totals cannot, by themselves, suggest a given level of health risk to the public. The specific material, its toxicity, the individual(s) exposed and the duration of exposure all are factors that contribute to the level of risk associated with air pollution.

The TRI is important because it provides information on the quantity and types of pollutants being released. More importantly, comparisons of TRI information over time can provide trend information showing progress (or lack of progress) in cutting pollution levels.

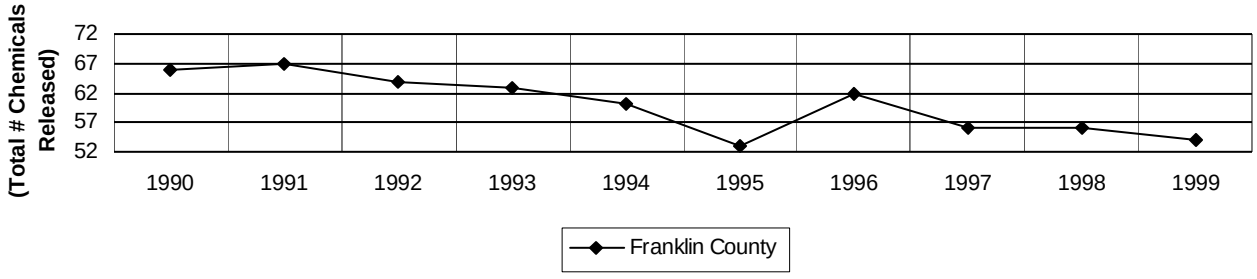
The TRI lists air releases in terms of fugitive and stack emissions. Stack emissions are releases to the air from a specific, identifiable source, such as a smokestack or vent. Fugitive emissions do not have a clearly identifiable single point of origin. These might be evaporative losses or leaks that occur in the manufacturing process.

In the most recent TRI information for Franklin County, fugitive and stack emission totals have been listed for over 50 different chemicals. While the amounts released may vary from year to year, the TRI shows that since 1990, two specific substances consistently appear near the top of the list. These substances are *glycol ethers* and *methyl ethyl ketone.* Glycol ethers are a class of chemicals used as a solvent for a variety of paints, dyes, inks, resins, varnishes and enamels. Some may also be used as dry cleaning compounds and plasticizers. Methyl ethyl ketone is a solvent used in the production of coatings and vinyl films, resins, paint removers, cements, adhesives, and cleaning fluids.

Other chemicals released in significant quantities include *n-Butyl alcohol, methanol, xylene and styrene*. n-Butyl alcohol is a moderately toxic compound used in the preparation of ethers. It is also a solvent for resins and coatings, is a dyeing assistant, and is used in detergent formulation. Methanol is used in the manufacture of formaldehyde, aviation fuel and automotive antifreeze, and is a solvent for shellac, resins, and dyes. Xylene is used in the production of aviation fuel and protective coatings, and as a solvent for resins, lacquers, enamels and rubber cements. Styrene, a synthetic resin, is used in constructing machine housing, electrical equipment and a variety of household wares and appliances.

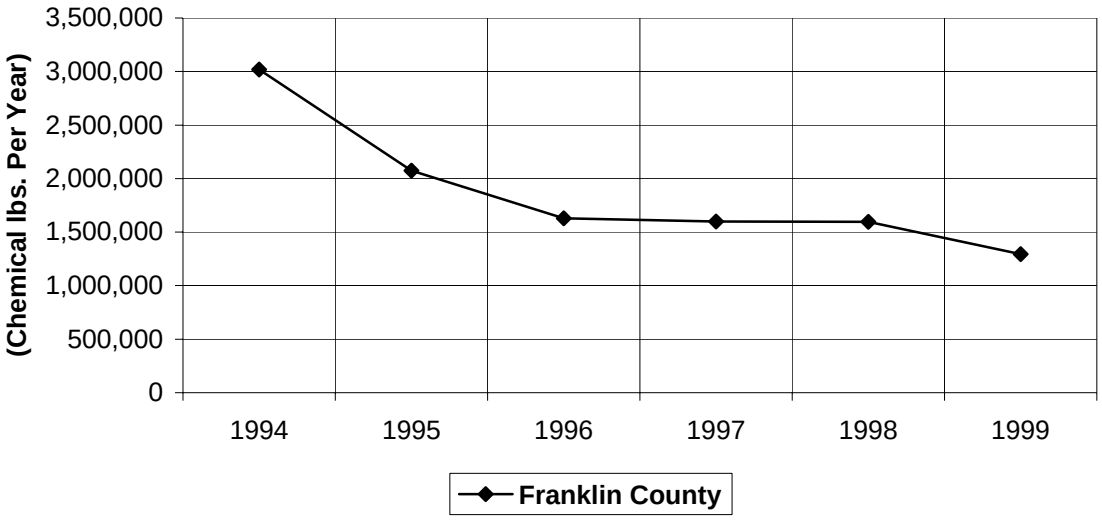
Adverse health effects from exposure to these chemicals vary, depending on the chemical, the concentration and the duration of exposure. However, according to the U.S. Department of Health and Human Services, some common symptoms from exposure in an occupational setting include eye, skin, or respiratory tract irritation.

TOXIC RELEASE INVENTORY DATA
Number of Chemicals



SOURCE: Ohio EPA Division of Air Pollution

QUANTITY OF AIR RELEASES



SOURCE: Ohio EPA Division of Air Pollution

AMBIENT AIR MONITORING

Ambient air can be thought of as air accessible to the general public, as opposed to air surrounding private manufacturing facilities. The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) to safeguard the public from selected air pollutants. The Ohio Environmental Protection Agency (OEPA) is responsible for monitoring and enforcement to ensure that the levels of these substances do not exceed specific set standards. According to OEPA, these standards are set after considering three important variables:

1. Concentration -- The measured chemical concentration, which can be expressed as milligrams per liter (m/L), parts per million (ppm), micrograms per cubic meter (ug/m3) or parts per billion (ppb);
2. Duration -- Measurements taken over 1 hour, 3 hours, 8 hours, etc.;
3. Restriction - The number of exceedances allowed before a violation occurs (i.e. none, one annually, two annually, etc.).

In some cases, standards are separated into two parts: *primary standards,* which refer to levels above which human health may be affected, and *secondary standards,* above which citizen welfare may be affected by animal, crop, vegetation and material damage.

Five pollutants are monitored by Ohio EPA to determine whether primary and/or secondary ambient air quality standards are met. These pollutants are *sulfur dioxide, carbon monoxide, ozone,* and *particulate matter* (dust, ash, etc.) equal or less than 10 microns in diameter (PM10), and *nitrogen dioxide*. Ambient air monitoring of lead was discontinued in 1998, primarily due to the dramatic reductions in lead because of the

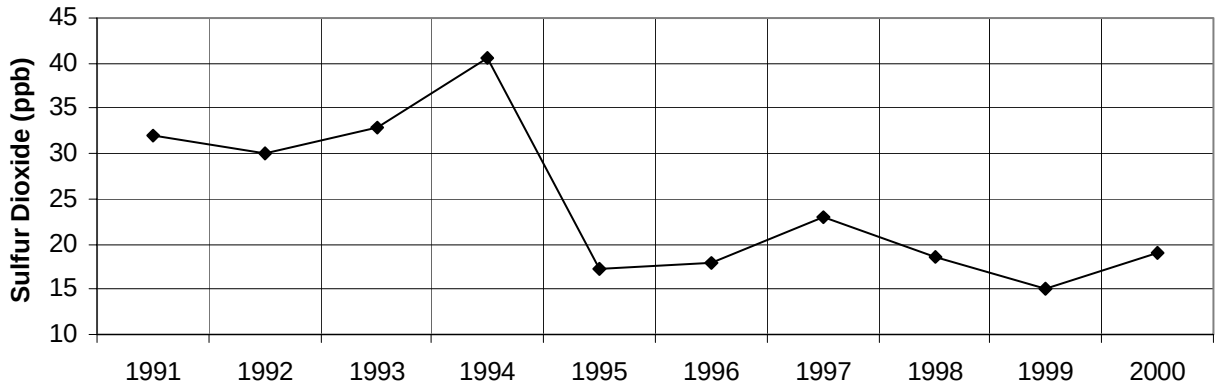
removal of lead additives from gasoline. A new standard has been proposed for *fine particulate matter* equal or less than 2.5 microns in diameter (PM2.5). OEPA has begun some local monitoring but the proposed federal standard has not been fully implemented.

Sulfur dioxide is a colorless gas formed during combustion. Major sources include the burning of sulfur-containing coals and other industrial processes. The chemical can affect the body if it is inhaled or comes in contact with the eyes or skin. Effects of overexposure include: irritation of the eyes and respiratory tract, coughing, chest tightness and breathing difficulties. Extremely severe exposures can cause a person to stop breathing.

Ohio EPA reports there are two sulfur dioxide monitoring sites in Franklin County. Each operates 24 hours per day. A violation of ambient air quality standards occurs if an average 24-hour concentration value at a single monitoring site exceeds 140 ppb more than once per year. The OEPA Division of Air Pollution Control reports there have been no violations for sulfur dioxide standards in Franklin County over the past 13 years.

AMBIENT AIR TRENDS

Sulfur Dioxide

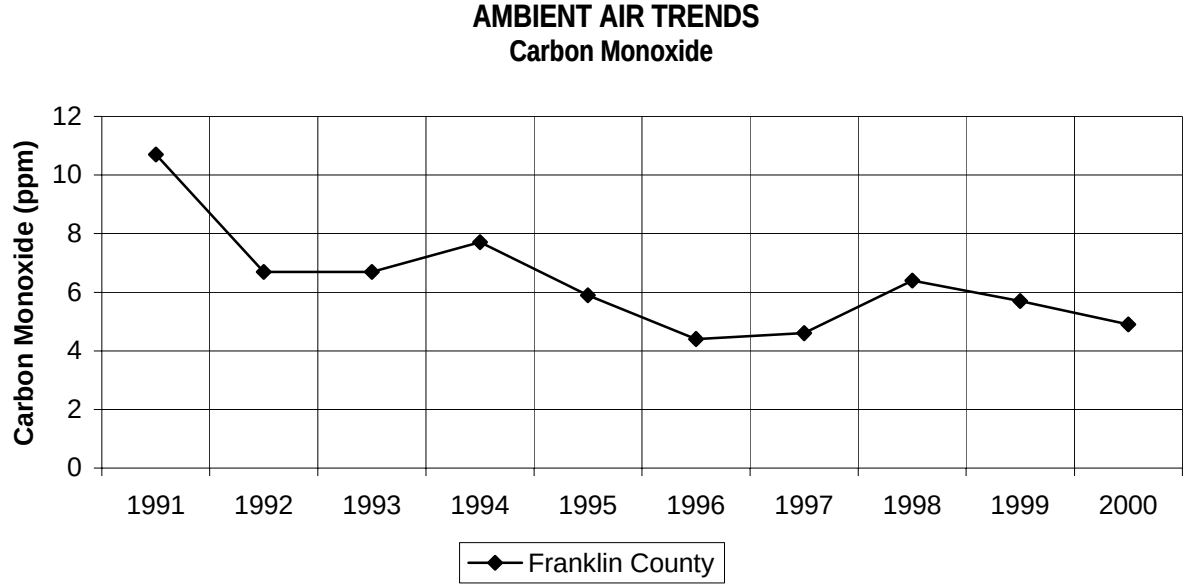


Note: *Sulfur Dioxide values represent 2nd highest 24-hour average*

SOURCE: Ohio EPA Division of Air Pollution Control

Carbon monoxide is a colorless and odorless gas produced in greatest quantity by the internal combustion engine. It can affect the body if inhaled, decreasing its ability to carry oxygen to tissues. Inhalation can cause headache, nausea, dizziness, weakness, rapid breathing, unconsciousness, or death in sufficient concentrations.

Ohio EPA reports three Franklin County monitoring sites, each operating daily over a 24-hour period. A violation of ambient air quality standards occurs if an average 1-hour concentration value at a single monitoring site exceeds 35 ppm more than once a year. OEPA reports there have been no violations for carbon monoxide standards in Franklin County in the past 13 years.



Note: *Carbon Monoxide values represent 2nd highest 1-hour average*

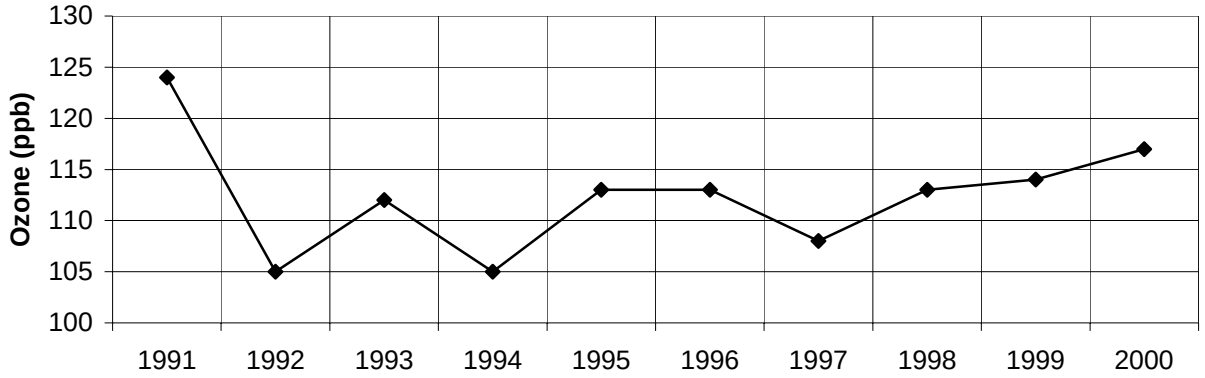
SOURCE: Ohio EPA Division of Air Pollution Control

Ozone is not directly emitted into the atmosphere, but is created in the atmosphere by chemical reactions involving sunlight and other pollutants. Nitrogen oxides (*see* Tailpipe Production) are important in triggering the sequence of chemical reactions resulting in ozone formation. Ozone is beneficial in the upper atmosphere, where it can help screen out the sun's ultraviolet rays.

However, if present in the lower atmosphere, ground-level ozone can cause health problems. Exposure can cause coughing and dryness or irritation of the eyes, nose and throat. In higher concentrations, more severe symptoms can include headache, tiredness, upset stomach, vomiting, and tightness in the chest. At the highest levels of exposure, lung damage or death may result.

Ohio EPA reports two Franklin County monitoring sites -- five in the Central Ohio area. Each operates continually over a 24-hour period. A violation of ambient air quality standards occurs if an average 1-hour concentration value at a single monitoring site exceeds 120 ppb on more than one day a year, as averaged over three years. OEPA reports six violations for ozone standards in Franklin County since 1987, most recently two exceedances in 1999.

AMBIENT AIR TRENDS
Ozone



Note: *Ozone values are 2nd highest 1-hr. reading. Area includes Franklin, Knox, Licking and Madison Counties.*

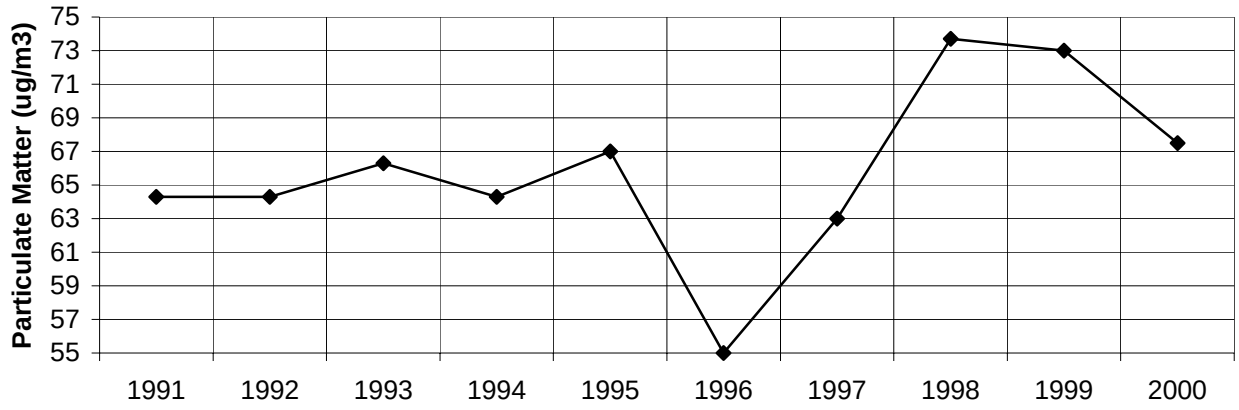
SOURCE: Ohio EPA Division of Air Pollution Control

Particulate matter is suspended particles of dust, soot, ash, etc., in the air. Research shows that inhalation of particulate matter equal to or less than 10 micrometers in diameter (PM10) can harm body tissue, including the linings of the lungs, nose and throat.

Ohio EPA reports three particulate monitoring sites in Franklin County. Each operates 24 hours a day, every six days. A violation of ambient air quality standards occurs if an average 24-hour concentration value at a specific site exceeds 150 ug/m3 more than once a year, averaged over a three-year period. OEPA reports no particulate matter violations in the past 13 years.

Health studies have raised new concerns about a new class of particulates, fine particulate matter. These are dust and soot particles 2.5 microns in diameter or smaller. The health concern is that these fine particulates may be pulled deeper into lung tissues and due to their size the lungs may be less able to expel them. OEPA began local monitoring in 1999. The proposed federal standard has not been finalized and is yet to be implemented.

AMBIENT AIR TRENDS
Particulate Matter



Note: *Particulate Matter values are the second highest 24-hour daily average*

SOURCE: Ohio EPA Division of Air Pollution Control

Nitrogen dioxide is a toxic gas formed in high temperature combustion processes. Major sources are fuel combustion, motor vehicles and certain chemical processes. Chemical exposure can be associated with a variety of ailments, including eye, nose and throat irritation, breathing difficulties, and lung damage.

National Ambient Air Quality Standards set the maximum allowable concentration for nitrogen dioxide at 0.053 ppm. According to Ohio EPA documents, violation of the standard occurs if an annual average of monitoring measurements exceeds this concentration level.

OEPA Division of Air Pollution Control staff report that Franklin County monitoring data for nitrogen dioxide is unavailable, because monitoring for the chemical is not required in Central Ohio. Staff say this type of data has not been collected in Franklin County for many years.

In the past, a major source of ***lead*** in urban areas came from vehicles burning leaded gasoline. The elimination of leaded fuels has significantly reduced lead air emissions. However, some urban manufacturing processes also produce this pollutant. Inhalation or ingestion of lead can cause muscle paralysis, anemia, kidney disease and damage and neurological disorders. Young children are particularly susceptible to the adverse effects of lead.

Ohio EPA discontinued ambient air monitoring for lead in 1998. There have been no lead standard violations in the past 13 years.

AIR QUALITY INDEX

Since 1977 Ohio EPA's Division of Air Pollution Control has used a national **Pollution Standards Index (PSI)** to inform the public of air quality. The PSI uniformly reported five criteria pollutants: PM10, sulfur dioxide, ozone, nitrogen dioxide and carbon monoxide. During 1999 U.S.EPA proposed changes to the PSI and a new **Air Quality Index (AQI)** was introduced. The new AQI includes three primary changes. It introduces a new index category of "unhealthy for sensitive groups". It proposes a new 8-hour average for ozone monitoring and a new monitoring index for fine particulate matter, PM2.5. The proposed ozone and fine particulate standards are being challenged within the federal courts and have not been implemented to date.

The new AQI readings are broken down into six different index categories. Values from 0-50 are considered "Good". Index values ranging from 51-100 are classified as "Moderate". Readings of 101-150, the new index category, is considered "Unhealthy For Sensitive Groups". From 151-200 air is considered "Unhealthy". Air is considered as "Very Unhealthy" if the AQI value falls between 201-300. Anything over 300 is considered "Hazardous." A summary of AQI values, with associated generalized health effects and cautionary statements, is given on the next page.

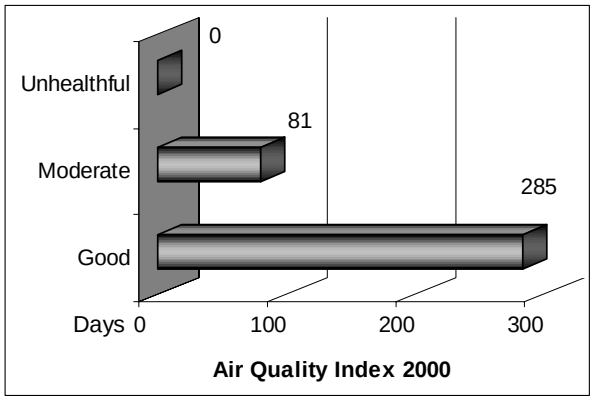
OEPA data shows that since 1993, overall air quality as characterized by the Pollution Standard Index and more recently the Air Quality Index has improved each year. Daily readings have almost always been either "Good" or "Moderate" over the reporting time period. The lone exception for the PSI came in 1995, when one "Unhealthful" day was reported. In 1999 the AQI reported one day that was registered as "Unhealthy For Sensitive Groups". According to OEPA, should the AQI exceed 100 in a major city, a "health advisory" is issued. If levels exceed 200 and are projected to persist, an "air pollution episode" exists. The Governor would then declare an alert and mandatory cutback of emissions from specified facilities would be ordered.

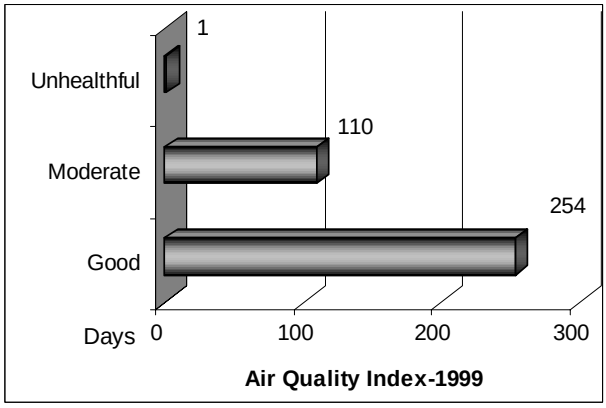
AIR QUALITY INDEX SUMMARY

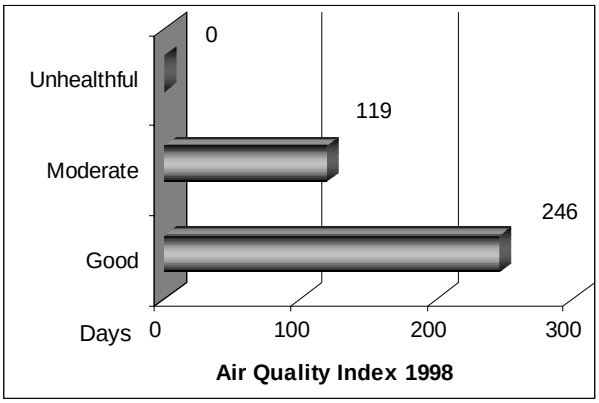
AQI CATEGORY	INDEX VALUE	GENERAL HEALTH EFFECTS	CAUTIONARY STATEMENTS
GOOD	50		
MODERATE	100		
UNHEALTHY FOR SENSITIVE GROUPS	101-150	Mild aggravation of symptoms in susceptible persons with irritation symptoms in sensitive groups.	Members of the sensitive groups are likely to experience more serious health affects than members of the general public.
UNHEALTHY	200	Mild aggravation of symptoms in susceptible persons with irritation symptoms in the healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity.
VERY UNHEALTHY	300	Significant aggravation of symptoms and decreased exercise tolerance in persons with heart or lung disease, with widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors and reduce physical activity.
HAZARDOUS	400	Premature onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons.	Elderly and persons with existing diseases should stay indoors and avoid physical exertion. General population should avoid outdoor activity.
	500	Premature death of ill and elderly. Healthy people will experience adverse symptoms that affect their normal behavior.	All persons should remain indoors, keeping windows and doors closed. All persons should minimize physical exercise and avoid traffic.

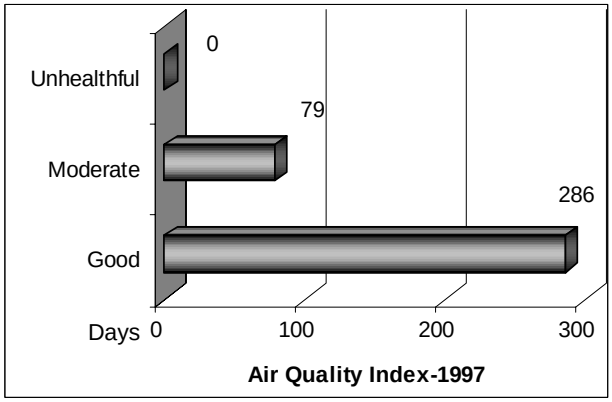
AIR QUALITY INDEX

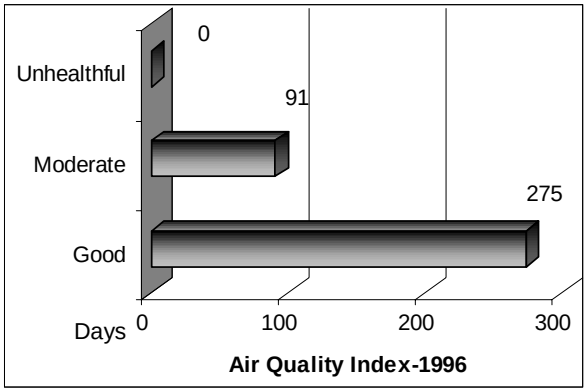
DAYS "GOOD," "MODERATE," OR "UNHEALTHFUL"
FRANKLIN COUNTY AIR

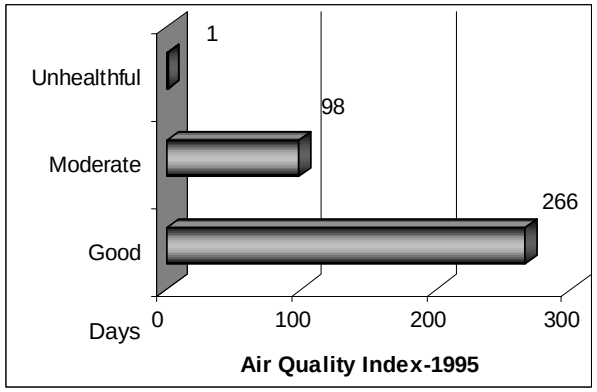










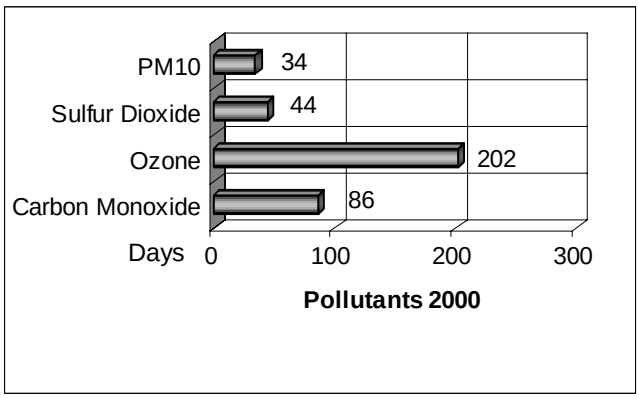


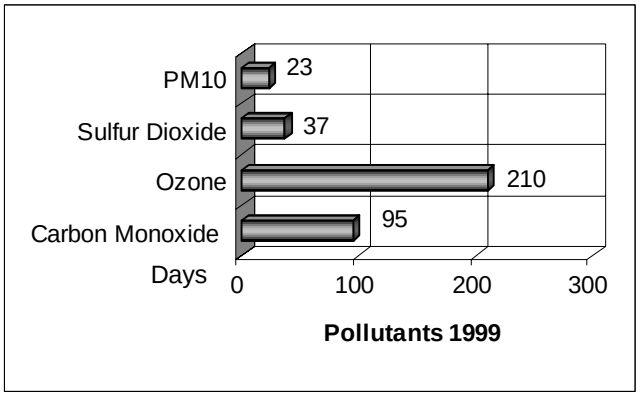
Source: Ohio EPA Division of Air Pollution Control

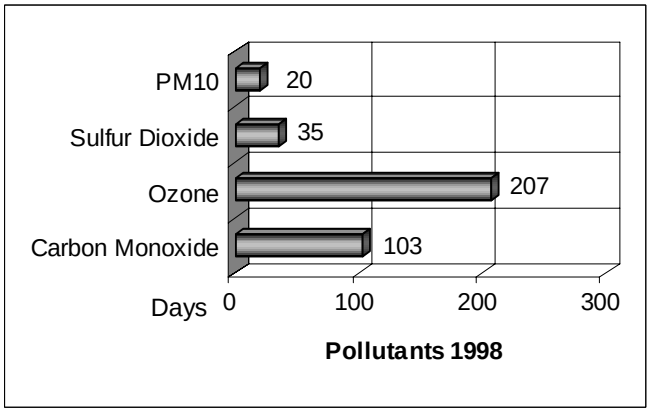
AIR QUALITY INDEX

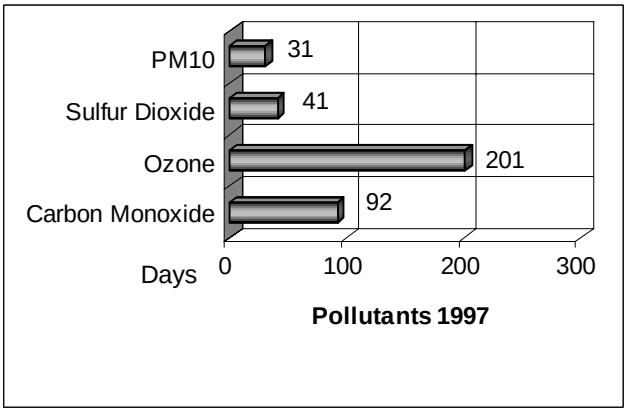
CRITERIA POLLUTANTS

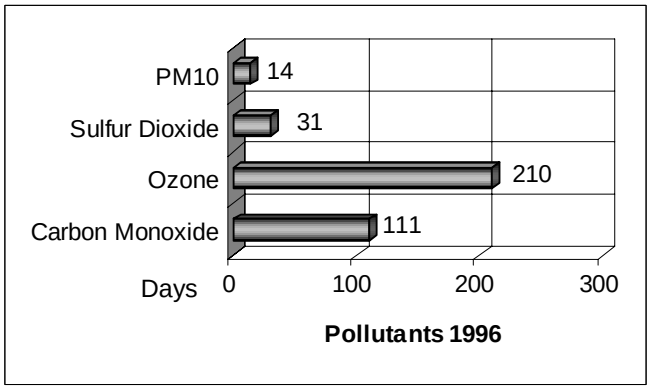
Number of days each pollutant was the highest AQI value during the year







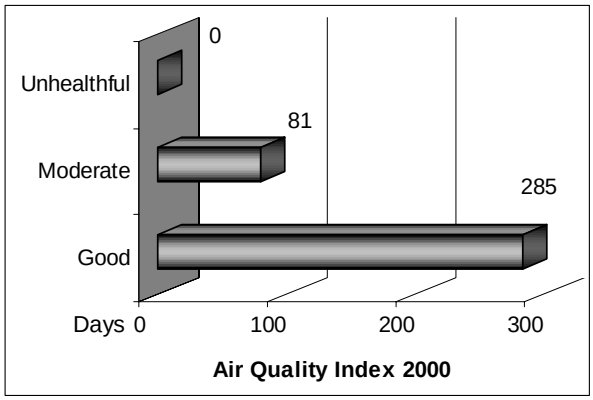


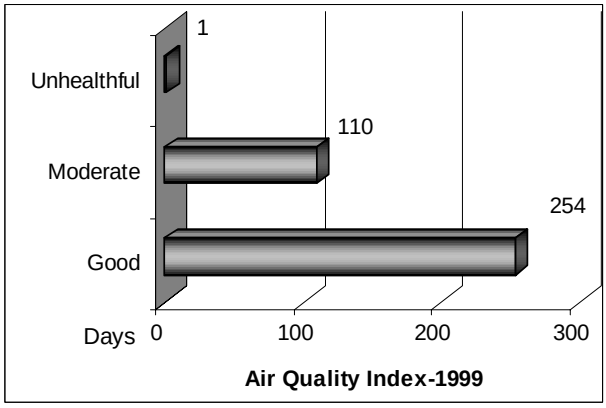


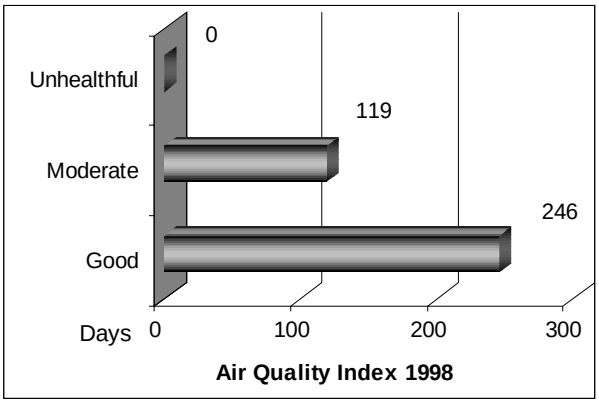
Source: Ohio EPA Division of Air Pollution Control

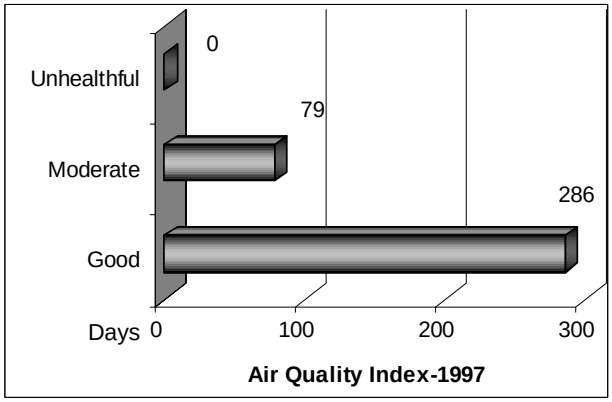
AIR QUALITY INDEX

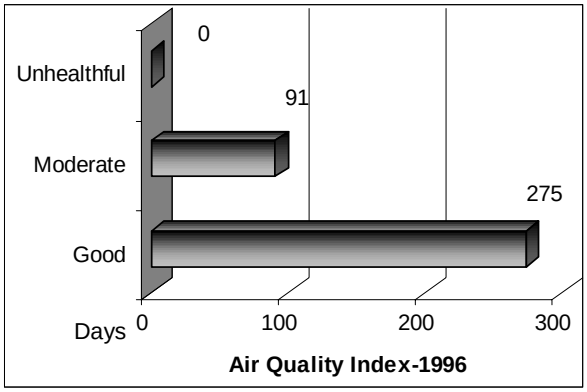
DAYS "GOOD," "MODERATE," OR "UNHEALTHFUL"
FRANKLIN COUNTY AIR

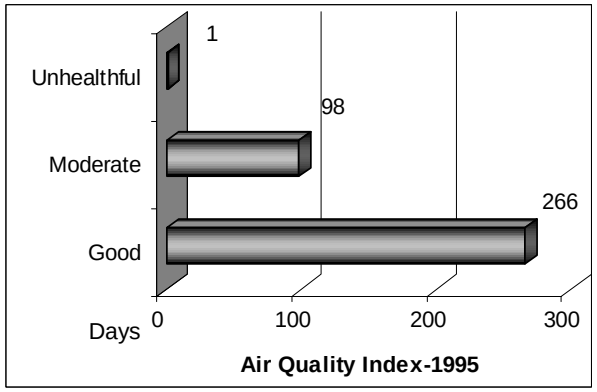












Source: Ohio EPA Division of Air Pollution Control

III.

COLUMBUS WATER CUSTOMERS

The vast majority of Columbus citizens get their drinking water from three primary sources: the Scioto River, which flows into Columbus from the northwest; Big Walnut Creek, which flows into Hoover Reservoir on the northeast side of the city; and the Teays Valley Aquifer, south of Columbus.

The Columbus Division of Water (DOW) operates three treatment plants designed to provide safe, clean, drinking water from each of these sources. The Dublin Road Water Plant treats approximately 60 million gallons of water daily from the Scioto River, supplying customers in downtown Columbus, west and southwest area of Columbus and Franklin County, including Hilliard, Grove City, Grandview and parts of Upper Arlington. The Hap Cremean Water Plant, located on Morse Road, treats 74 million gallons of raw water pumped daily from Big Walnut Creek below Hoover Reservoir. The facility supplies customers in most of the northern two-thirds of Franklin County, including Columbus, Dublin, Gahanna, Worthington, Bexley, Whitehall, New Albany and Reynoldsburg. The Parsons Avenue Treatment Plant treats an average of 20 million gallons of water daily from the Teays Valley Aquifer. It supplies customers in southeast and south Columbus, and southern Franklin County.

Each of the three treatment plants uses a multi-step process to ensure that the finished water supplied to customers meets all Safe Drinking Water Act (SDWA) standards as set forth by the U.S. Environmental Protection Agency (USEPA). Treatment takes about 24 hours and involves eight basic steps.

First, the untreated water is pumped into treatment plants, where rotating screens remove large objects such as sticks and leaves. The water then enters flocculation basins, where a chemical is added to cause suspended particles in the water to clump together. The contaminants then settle to the bottom of large settling basins and are pumped to storage lagoons.

Adding lime and soda ash then softens the remaining water. Carbon dioxide is added to lower the water's pH level. Next, the re-carbonated water goes through a filtration process, where sand, gravel and anthracite coal filters remove remaining fine particles.

Three important steps remain: chlorine is added as a disinfectant, fluoride is added to protect teeth, and a corrosion inhibitor is added to protect water lines and plumbing. The inhibitor also helps to prevent unwanted metals like lead from leaching into home water residential plumbing.

As mentioned, finished water must meet certain health (primary) standards as established by the Safe Drinking Water Act. Primary standards are expressed as Maximum Contaminant Levels (MCLs), which specify the level of a chemical compound that may be present in drinking water after treatment. The SDWA has established MCL values for many different chemicals, including inorganics, volatile organics, synthetic organics, radiologicals and microbiologicals. A MCL can be expressed in many ways: as milligrams per liter (mg/L) or parts per million (ppm), or as micrograms per liter (µg/L) or parts per billion (ppb). Depending on the chemical, SDWA provisions specify that a MCL may be based on a single test result or a running annual average of multiple tests.

Two important points must be made when considering MCL values. In the case of drinking water, many people assume that exceeding a MCL automatically represents a risk to human health. However, MCL standards assume a lifetime of consumption at the given level. More importantly, MCL calculations represent extremely conservative estimates. In deriving these values, a number of safety factors are used to ensure that one-time or periodic violations do not result in significant risks to human health. These safety factors mean that in many cases, a chemical MCL may be hundreds (or even thousands) of times lower than the actual amount that would cause health problems if sporadically consumed.

Water treatment and drinking water quality are regulated by the Ohio Environmental Protection Agency (OEPA), which works with local officials to ensure the safety and quality of drinking water supplies. OEPA-certified Division of Water plant operators, as well as scientists at the division's Columbus Water Quality Assurance Laboratory (WQAL) conduct Columbus City water testing. These personnel perform thousands of tests annually on dozens of chemical compounds. In instances where MCLs have been established, the chemical levels found in finished water typically fall well below specified levels. In fact, many compounds are not detected.

However, some chemicals may be detected, occasionally approach or even exceed MCL limits. *Nitrate, trihalomethanes* and *atrazine* are three such examples.

Nitrate is commonly applied to agricultural lands as a component of fertilizer and is periodically washed into area rivers through storm water runoff or farm flooding. Ingesting water with high nitrate levels may cause adverse health affects to infants less than 6 months of age by preventing the body from carrying oxygen in the bloodstream. Nitrate is particularly troublesome because it can't be removed through conventional water treatment techniques.

The established MCL for nitrate is 10 mg/L, and a violation occurs if the MCL is exceeded. If testing shows the MCL is exceeded, water operators are required to notify the public. This public notification provides information on the chemical and its potential health effects. Customers are advised to prepare infant formula with distilled water until the DOW announces that nitrate levels have fallen below the established MCL value.

According to division data, there have been nitrate exceedances in six of the past 12 years. The most recent was in 2000, when there were 23 days of nitrate exceedances. Other exceedances occurred in1999 (6), 1994 (11), 1992 (39), 1990 (17), and 1989 (8).

Columbus Finished Water Data
Nitrate

AVERAGE ANNUAL LEVELS(mg/L)	1994	1995	1996	1997	1998	1999	2000
Dublin Rd. Treatment Plant	3.2	4.2	4.3	3.6	4.5	2.3	4.8
Hap Cremean Treatment Plant	1.0	1.6	1.5	2.1	1.5	1.2	1.7
Parsons Ave. Treatment Plan	<1	<1	<1	<0.2	<0.2	<0.13	.07

(MCL = 10)

Source: Columbus Division of Water

Trihalomethanes are a group of byproducts formed when chlorine disinfectant reacts with organic materials during the water treatment process. Some of these byproducts are considered possible human carcinogens by USEPA.

The MCL for trihalomethanes is based on a running annual average and has been set at 0.10 mg/L. A violation would occur if the averaged value of four consecutive quarterly samples exceeds the MCL. The Division reports there has never been an exceedance of the MCL standard for trihalomethanes.

Columbus Finished Water Data
Trihalomethanes

AVERAGE ANNUAL LEVELS (mg/L)	1994	1995	1996	1997	1998	1999	2000
Dublin Rd. Treatment Plant	0.06	0.06	0.04	0.04	0.04	0.04	0.06
Hap Cremean Treatment Plant	0.07	0.09	0.06	0.06	0.06	0.05	0.06
Parsons Ave. Treatment Plant	0.02	0.02	0.01	0.01	0.01	0.01	0.02

(MCL = 0.10)

Source: Columbus Division of Water

Atrazine is an herbicide commonly used by farmers to control weeds, increase yields and reduce production costs. Like nitrate, it is applied to agricultural land and is periodically introduced into raw water supplies through storm water runoff events and farm flooding. Conventional treatment techniques are ineffective in removing the chemical from water supplies. USEPA maintains that atrazine is a possible carcinogen at certain levels of exposure, based on studies with certain laboratory animals.

Division of Water personnel monitor Atrazine levels in both raw and finished water year-round. The MCL is based on a running annual average and has been set at 0.003 mg/L (or 3 parts per billion). A violation would occur if the averaged value of four consecutive quarterly samples exceeds the MCL. Again, however, the Division says that there has never been an exceedance of the MCL standard for atrazine.

Columbus Finished Water Data
Atrazine

AVERAGE ANNUAL LEVELS (mg/L)	1994	1995	1996	1997	1998	1999	2000
Dublin Rd. Treatment Plant	0.0007	0.0003	0.0007	0.0005	0.0006	0.0011	.0012
Hap Cremean Treatment Plant	0.0006	0.0016	0.0016	0.0012	0.0014	0.0016	.00095
Parsons Ave. Treatment Plant	N/D	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	N/D

MCL = 0.003)

Note: N/D = Not Detected

Source: Columbus Division of Water

WATER CUSTOMERS IN UNINCORPORATED AREAS

Those living outside areas serviced by the Columbus Division of Water obtain their water directly from private wells that tap into ground water sources. In many areas of Franklin County, as in many areas of the country, ground water is the sole source for drinking water, as well as for household, farming and manufacturing uses.

Ground water may be found in underground rivers, may collect in underground channels or depressions, or can also be found in the spaces between particles of soil and rock, underground crevices or cracks. At the point where all underground openings are filled with water we find the *water table*. Below this level is what is referred to as the *saturated zone* and above it, the *unsaturated zone.* Much of the earth's water filling these underground spaces is within 300 feet of the surface.

Ground water does not sit still; it provides an important link in the hydrologic cycle because it circulates. After a storm, while some rain drains to nearby surface water bodies, the remaining moisture percolates through the earth's surface to the saturated zone (recharge). This ground water eventually flows and drains to streams, rivers and marshes, where it evaporates to later become rain once more.

Although ground water flows through underground rock formations, that rate of flow can vary dramatically. In more permeable material, ground water may flow several yards daily, although this is exceptional. In impermeable materials, such as clay and shale, ground water may flow very slowly. In some cases, ground water may move only a few inches in a century. Water percolating into the earth may spend days, weeks, or thousands of years or more underground.

Ground water is cleaned as it flows through underground soils, which act as a natural filter. This filtering, together with the long residence time underground, means that ground water is usually free of naturally occurring disease-causing organisms. Even so, human activity can put ground water at risk from chemical or biological pollutants. Leaking underground pipes or storage tanks, industrial spills, seepage from waste disposal sites or faulty septic systems can be significant sources of pollution.

Most pollutants have the potential to contaminate large amounts of ground water, and as ground water moves it can spread the effects of spills far beyond the original site. One gallon of gasoline, for example, can contaminate millions of gallons of ground water. In many cases, the problem is only noticed long after contamination occurs. Once contaminated, ground water sources are very difficult to clean up.

The Franklin County Health Department provides assistance to well owners living outside the Columbus service area. It may be surprising to learn that in terms of health standards, private wells are not regulated by government agency or statute. However, Franklin County Health officials provide testing services upon request to well owners concerned about water quality and/or possible ground water contamination. The property owner can then use sampling results to determine whether to continue to use that particular water well.

County officials test for a variety of organic and inorganic compounds in private wells located throughout the county. They report that these wells have been developed utilizing every county aquifer. The construction, depth, age, and condition of the wells vary significantly.

Well testing is done on a substance-specific basis --- officials search only for the substance or substances of particular concern to the property owner. As with City water sampling results, County officials say that in most cases, contaminants are either not detected or are found in minute quantities. Three substances sometimes found during testing are *coliform, nitrates* and *lead.*

Coliforms are naturally occurring species of bacteria found in soil, plants, or the waste products of humans and other mammals. While most coliform species are not a health threat, some species are capable of causing disease. Ground water contamination from coliform bacteria usually results from poorly constructed water wells or failing septic systems. County Health Department officials classify well samples as either "acceptable" or "unacceptable" concerning coliform. These criteria have been adopted from Ohio Department of Health guidelines, which set "acceptable" or safe concentration limits at 2 coliform organisms or less per 100 milliliters of water.

As mentioned earlier, *nitrate* is commonly applied on agricultural lands as a component of fertilizer. County officials reference the "Public Drinking Water Standards" (PDWS) when considering the question of nitrate levels in well water samples. These PDWS actually correspond to the MCLs set forth by Congress in the Safe Drinking Water Act and associated regulations. In sampling, Franklin County health officials talk of nitrates in terms of "exceeding" or "not exceeding" Public Drinking Water Standards (or Safe Drinking Water Act MCLs). The established MCL for nitrate is 10 mg/L.

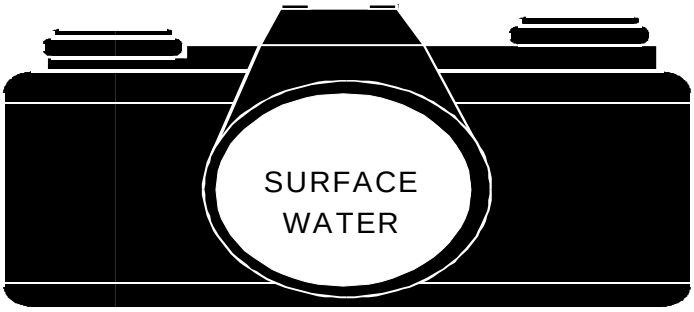
Lead is a metal that can cause a number of serious health effects, given sufficient exposure at high concentrations. Anemia, kidney and neurological damage have all been linked to long-term exposure.

A significant exposure risk comes from lead-based interior paints, which were widely used in homes built before 1950. The use of lead paint declined over time after 1950. Since 1978, interior paints have been lead-free.

However, another possible lead exposure route may be from home plumbing systems. In some cases, the chemical may contaminate drinking water as pipe solder dissolves and lead enters residential water lines. The SDWA establishes no MCL, or health-based value, for lead. However in considering public water treatment and distribution systems, the SDWA sets an "action level" of 15 parts per billion. Exceeding this action level necessitates that public water treatment operators modify their corrosion control practices to prevent lead from leaching into the water distribution system. Franklin County officials reference this same 15 ppb action level in considering whether private well samples "meet" or "exceed" Public Drinking Water Standards.

Both county and city health departments provide information about water well and ground water testing upon request. Private laboratories and testing services also provide direct services.

IV. SURFACE WATER



Note: Information in this section of the 2001 Environmental Snapshot comes from the Ohio Environmental Protection Agency's Water Resource Inventory. The Inventory represents a comprehensive assessment of the chemical, physical, biological and ecological health of Ohio's Water resources – including its rivers, lakes, streams, reservoirs, wetlands and groundwater. Because of the comprehensive nature of the document, the Water Resource Inventory is published only once every other year. The current information was first published as a part of the 2000 Environmental Snapshot and is reviewed again here.

BACKGROUND

With 29,000 miles of streams and rivers, hundreds of inland lakes and reservoirs and 236 miles of shoreline along Lake Erie, Ohio can certainly be considered a water-rich state. Our surface waters provide an important source of food, drinking water, recreational opportunities, and aesthetic beauty. However, human activities may threaten the quality and integrity of our surface waters and their inhabitants.

While surface water pollution continues to be an issue of concern, there can be no doubt that the overall quality of our inland streams and rivers has improved significantly in the 26 years since the passage of the Federal Water Pollution Control Act (or Clean Water Act). Most of this improvement can be traced directly to improvements to wastewater treatment plants. More than $6 billion in public and private funds has been spent in Ohio on control of "point source" pollution over the last quarter century. These upgrades have greatly reduced the quantity of industrial and sewage discharge into area surface waters. While these point source discharges have been reduced, they have not been eliminated; these and other significant sources of surface water pollution continue to threaten waterway health.

WATERWAY ASSESSMENT

The Clean Water Act requires each state to submit a report every two years on the status of that state's surface and groundwater. The information is supplied to the U.S. Environmental Protection Agency and submitted in a national summary to Congress.

In Ohio, one comprehensive source for this information comes from the Ohio Environmental Protection Agency (OEPA). OEPA, through its Division of Surface Water, Ecological Monitoring and Assessment Section, conducts a biennial inventory of Ohio waterways. The inventory serves as a status report, with the intent of checking our state's progress in achieving specific water quality and pollution control objectives. Information contained in the *Water Resource Inventory* is a compilation of information from a number of organizations – OEPA and others, including the Ohio Department of Natural Resources, the Ohio Department of Transportation, and the Ohio State University. Some volunteer monitoring is also used in data compilation.

In fact, Ohio EPA has been developing capabilities since the 1970s on "vital signs" that can accurately assess the state's surface waters being fully able to support healthy populations of aqua life, recreational opportunities and other beneficial uses by the year 2000.

HOW THIS PROGRESS IS MEASURED

The state's *Water Resource Inventory*, published every two years, represents an assessment of chemical, physical, biological and ecological information for rivers and streams, lakes, and reservoirs, wetlands and groundwater. Information is available on area waterways on a county-by-county basis. Data presented in the following section of this document apply to Franklin County rivers and streams.

Why is waterway assessment information so important? In addition to affecting ecosystem health, biological and chemical threats may also threaten humans. Surface water pollution threatens fish food sources, limits the quality and quantity of recreational opportunities degrades potential drinking and manufacturing water supplies and diminishes the aesthetic beauty of natural landscapes.

Efforts to assess surface water quality have often concentrated on administrative functions. While information like the number of permits issued, fines levied or dollars spent is relatively easy to summarize, it does not truly provide relevant information on environmental health or status.

Many environmental organizations have shifted their efforts toward using more integrated and holistic information that speaks directly to environmental improvement. For OEPA's Division of Surface Water, this shift occurred roughly around 1988, when past and current division assessment data began to be considered in a more comprehensive, watershed-based manner. In recognition of this change, division personnel considered surface water trends in "Pre-88" and "Post-88" terms. The "Pre-88 and "Post-88" designations are used as a measure of comparing and contrasting environmental assessment informational assessment information.

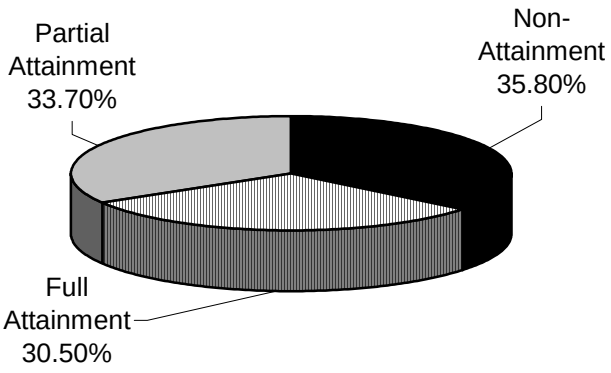
This document includes only four of the hundreds of measures used by OEPA to assess surface water health and status. These include:

Aquatic Life Condition: Can a river or stream fully support healthy and diverse populations of aquatic life? If so, what portion of that river or stream? Various pieces of information, or criteria, are examined to determine this, including water chemistry, physical and habitat assessment, and biosurveys. All of this information is summarized to determine a water body's attainment status. Four definitions are used:

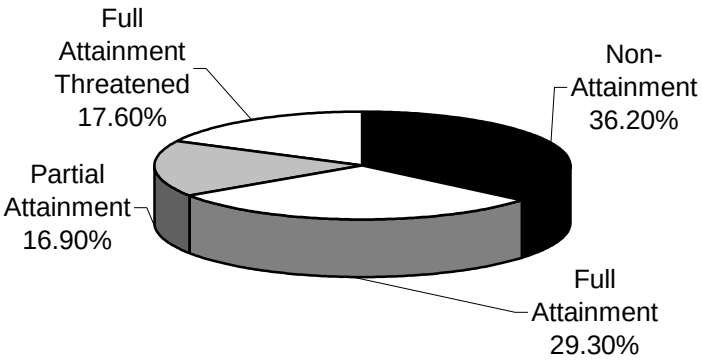
1. Full Attainment: all criteria are met to support healthy and diverse aquatic populations.
2. Full Attainment, Threatened: all criteria are met to support healthy and diverse aquatic populations, but whose status is threatened.
3. Partial Attainment: some criteria are met while others are not.
4. Non-Attainment: no criteria are met.

AQUATIC LIFE
Use Attainment

Franklin County Pre 1988 Sampling

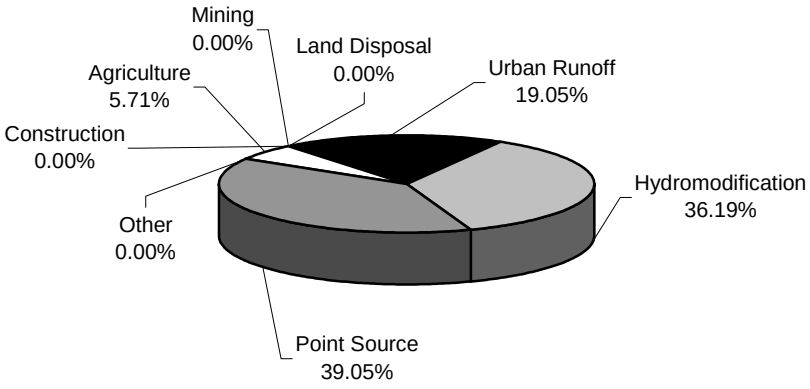


Franklin County 1988-1996 Sampling

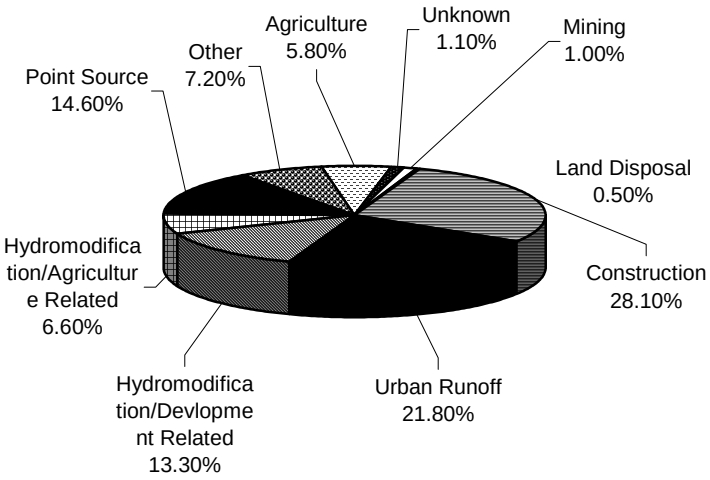


AQUATIC LIFE
Changes in Major Sources of Impairment

Franklin County Pre 1988 Percent Total Miles Sampled and Impaired



Franklin County 1989-1996 Percent Total Miles Sampled and Impaired



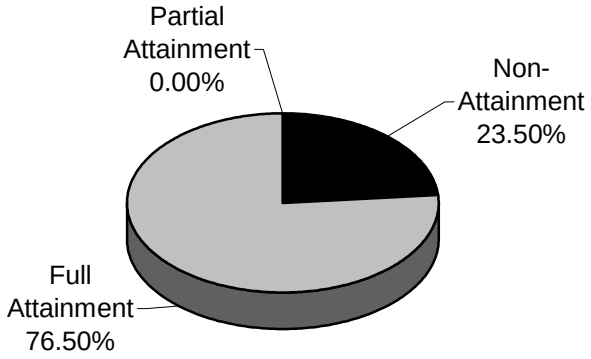
Recreation Use: Are waters suitable for human contact? Can people safety canoe, swim and wade in these waters? The principal criteria for assessment are fecal bacterial courts, which are incorporated into an attainment scale:

1. Full Attainment: the number of miles or percent miles of assessed rivers/stream that support all recreational uses.
2. Partial Attainment: the number of miles or percent miles of assessed rivers/streams that support only some recreational uses.
3. Non-Attainment: the number of miles or percent miles of assessed rivers/streams not suitable for recreational use.

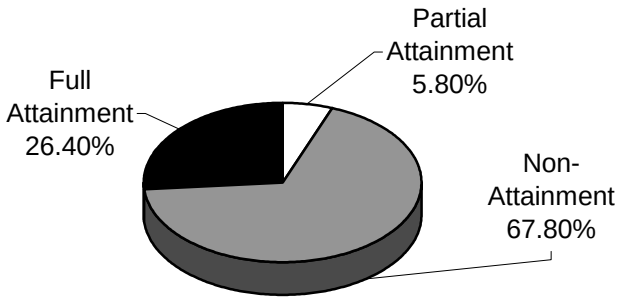
In the past, the most significant sources of fecal bacteria were raw and partially treated municipal sewage discharged into area rivers and streams. In recent years, pollutants from these sources have greatly decreased as municipalities have spent millions to upgrade their wastewater treatment plants. However, fecal pollution from wastewater plants has not been eliminated, and other significant sources remain, including urban runoff, combined sewer overflows, and livestock and agricultural runoff.

RECREATION USE ATTAINMENT

Franklin County 1978-1988
Percent Total Miles Sampled



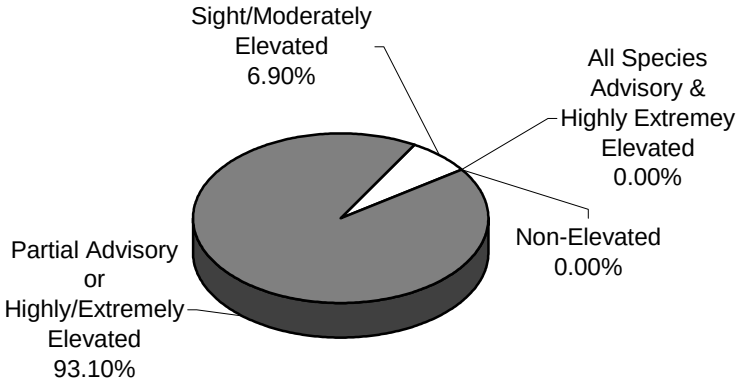
Franklin County 1989-1996
Percent Total Miles Sampled

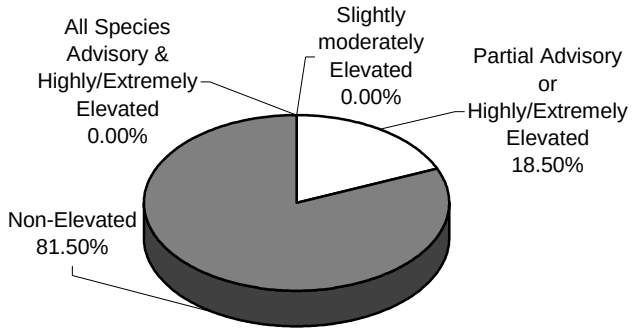


Fish Tissue Analysis: Information on the presence of contaminated fish is useful in identifying potential risks to human health through consumption. It is also useful in identifying waters affected by toxic substances and in tracking pollution abatement methods. About 600 samples per year are analyzed in Ohio by OEPA, in cooperation with the Ohio Department Natural Resources, Ohio Department of Agriculture and Ohio Department of Health. Rivers and streams are then classified as follows:

1. *Non-Elevated:* monitored rivers/stream miles having fish samples with low or non-detectable levels of PCBs, pesticides, metals or other organic compounds.
2. *Slightly/Moderately Elevated:* monitored rivers/stream miles had fish samples with somewhat higher levels.
3. *Partial Advisory or Highly/Extremely Elevated:* monitored rivers/stream miles where sampling has shown high to extremely elevated levels of contaminants, or consumption advisories for selected species have been issued. (PA or H/EE)
4. *All Species Advisory and Highly/Extremely Elevated:* monitored rivers/stream miles where samples have shown high to extreme levels of contaminants, and consumption advisories for all species have been issued. (ASA and H/EE)

FISH TISSUE ANALYSIS





SOURCE FOR ALL ABOVE SURFACE WATER DATA: Ohio EPA Division of Surface Water-Ecological Monitoring & Assessment Section

V. SOLID WASTE

BACKGROUND

Americans live in a throwaway society. Our consumer mentality results in the generation and disposal of millions of tons of refuse each year. Although most of us seldom think about what happens to our refuse when it leaves the curb, the issue of solid waste management has significant implications for our society and us.

The creation of material goods, the collection of waste materials and the managing of this material up to, and including, disposal all require vast amounts of energy. This in turn requires the utilization of significant natural resources. In addition, the creation of refuse results in the generation of pollution, which must be carefully managed to ensure it does not harm the environment.

Given this, it may be somewhat surprising to learn that professional management of solid waste is a relatively recent development. Up until 100 years ago, there was no refuse collection by cities because there were no modern forms of transportation. Dumping refuse at the curb was a common and accepted way of disposal for city residents. This began to change, however, as cities became denser, the stench and unsightliness associated with garbage increased, and people realized that the increasingly unsanitary conditions were a serious health hazard.

But even as change occurred, it was hardly efficient. Garbage was simply dumped in nearby rivers or open pits, or openly burned. Until the 1950s, in many cities garbage was disposed of by simply hauling it to remote areas and feeding it to hogs. This practice came to an end with disease outbreaks that killed thousands of animals.

Disposal methods modernized with the availability and use of specialized vehicles that could easily collect, compact and process material. Today, the collection, processing and disposal of refuse are key responsibilities for many municipal governments. It is easy to see why. In the past 30 years, some elements of the waste stream, such as durable goods (i.e., appliances), paper, and clothing, have nearly tripled. The amount of container and packaging material has also increased significantly, and more yard waste is entering the waste stream.

.

Studies indicate that, on average, each of us generates 4.4 pounds of waste per day. The total amount of waste material generated annually is expected to rise as our population increases. It will continue to be important to manage our waste stream in the most efficient and effective manner possible, and to look for ways to reduce what is generated.

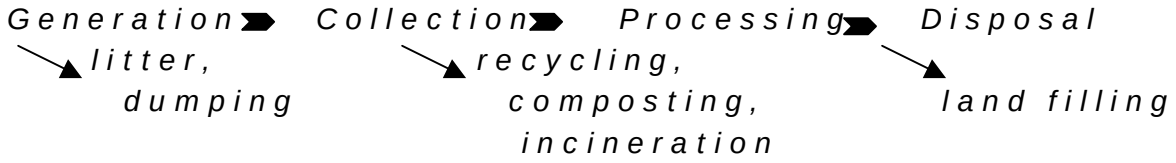
What we throw away each day takes all forms: wrappings, bottles, boxes, foodstuffs, cans, yard waste, and a host of other materials. A recent U.S. EPA study showed the solid waste stream is made up of the following components:

ORGANIC MATERIALS	
Paper	*37.5%*
Yard Waste	*17.9%*
Kitchen Scraps	*6.7%*
Wood	*6.3%*

INORGANIC MATERIALS:	
Plastic	*8.3%*
Metal	*8.3%*
Glass	*6.7%*
Other	*8.3%*
	100.0%

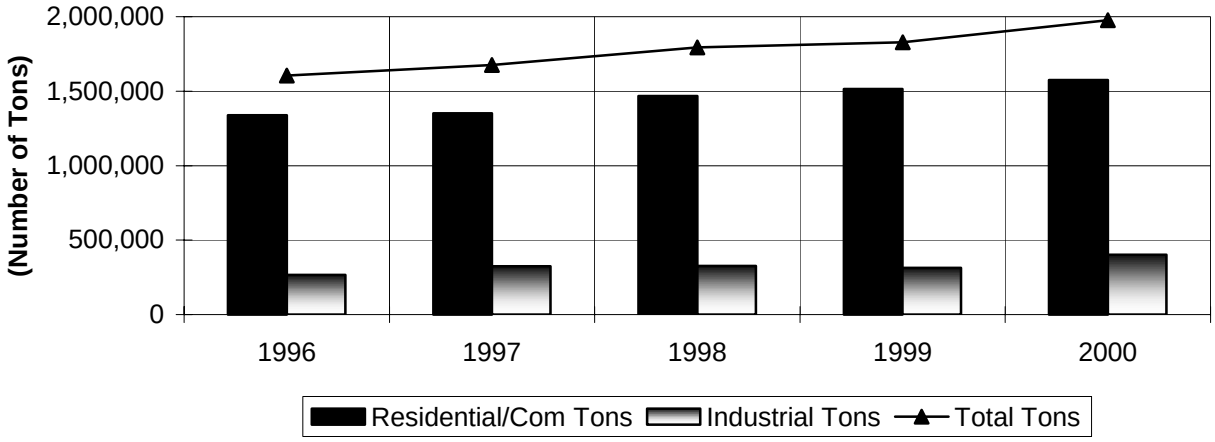
WHO'S RESPONSIBLE FOR WASTE MANAGEMENT?

This depends on which portion of the process is being considered. Solid waste management may best be thought of as a continuous, integrated operation. From beginning to end, this process consists of four general phases: *generation, collection, processing* and *disposal.* Responsibilities may rest with single organizations or be shared by many, depending on specific circumstances. The waste management continuum can be graphically depicted as follows:



Waste generation is the creation and/or use of material that will ultimately be discarded. This occurs in the manufacturing process, where consumer materials are created or packaged. It also occurs in individual homes, where people make decisions every day on what to use, how much to use, and in the end, how much to throw away. Ultimately, the primary responsibility for waste generation rests with the individual consumer. It is the consumer who can impact waste generation by demanding materials with less packaging. And it is the consumer who can choose to use less, use more, or continually reuse materials rather than throw them away. These efforts at source reduction can greatly affect the amount of waste material that must be managed.

SOLID WASTE GENERATION

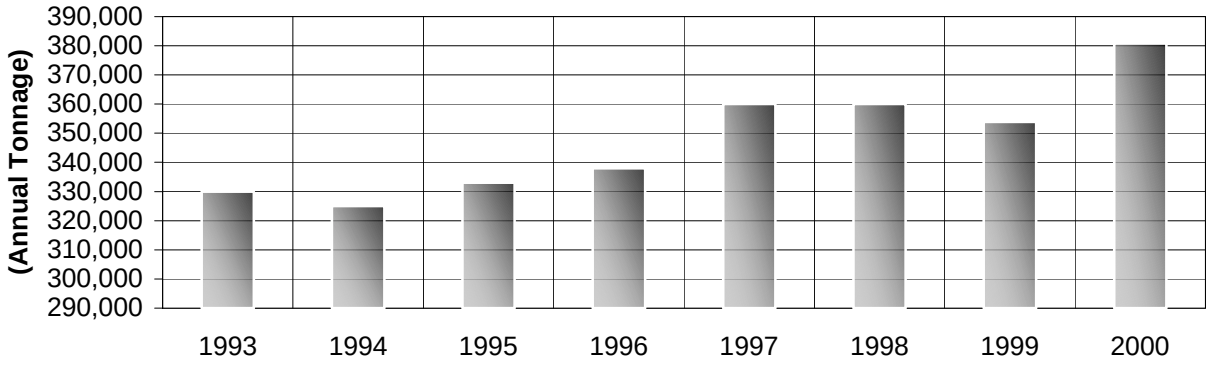


Note: Totals reflect tonnage generated in Franklin County Solid Waste Management District.

SOURCE: Solid Waste Authority of Central Ohio.

Waste collection is the gathering and transport of refuse material. This can be done with crews manually loading refuse into packer trucks, where the material is compacted to increase collection efficiency. In some cases, a mechanized collection system is used; where a driver uses a machine to grab and lift refuse into the compacting truck. Collection activities can be done either by public or private collection methods. In Franklin County and many area municipalities, private companies are responsible for trash collection. In Columbus, residential collection is the responsibility of the Division of Refuse Collection. Private haulers handle most commercial accounts.

ANNUAL COLLECTED TONNAGE BY CITY OF COLUMBUS



Note: *Municipal solid waste only*

SOURCE: Division of Refuse Collection

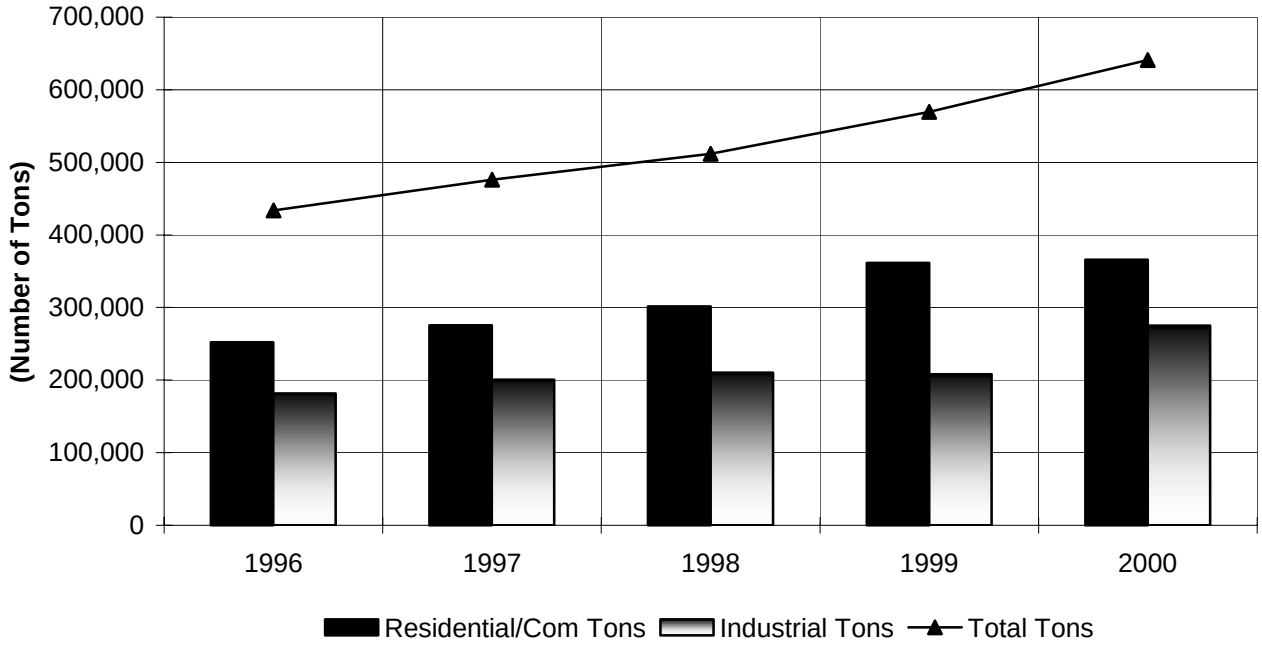
An intermediate step in waste management is ***processing***. Processing involves some manipulation of the waste stream prior to ultimate disposal. This manipulation is usually concerned with reducing material volume and conserving landfill space. One significant processing step is *incineration*. Here, non-burnables are removed from the waste stream, which is then burned in specially designed plants. In some cases, burning refuse is used as a fuel to produce electrical energy. While incineration can prove useful in volume reduction, with ratios of 10:1 sometimes achieved, this method has fallen out of favor for a variety of reasons. These include high cost of plant construction and operation, and the production of dioxin, heavy metals and other pollutants released as by-products of refuse incineration. Columbus operated a facility that incinerated 20 to 30 percent of all waste generated in Franklin County. At the time of its closure in 1994, the inability of government officials to mandate that area refuse be delivered to the facility made its operation economically unfeasible. At the same time, U.S. EPA and community concerns were being voiced about smokestack emissions from the facility.

A more familiar component of waste processing involves *recycling.* Here, various materials are pulled from the waste stream for eventual re-use. Recycling is an important waste management tool for a number of reasons. It conserves natural resources, because manufacturers can use recycled rather than virgin materials in the production process. Recycling cuts down on pollution, because recycled materials require far less energy to remanufacture new products. And, re-using items in the waste stream ultimately reduces the amount of material we throw away, conserving landfill space.

While recycling has the potential to provide significant benefits, it must be noted that it does not represent a single solution to solving our waste disposal difficulties. Recycling possibility does not necessarily translate to practicality. Successful recycling programs depend on a number of factors, including reprocessing costs, process efficiencies, and availability of stable markets for materials. Many do not consider, for example, that recycling itself is a manufacturing process that uses capital, labor and energy resources. In many cases, the cost of these resources may be worth more than the product produced. It must also be remembered that there are different issues to consider with each type of recycled product. The ability to successfully recycle one type of material may not guarantee success with others.

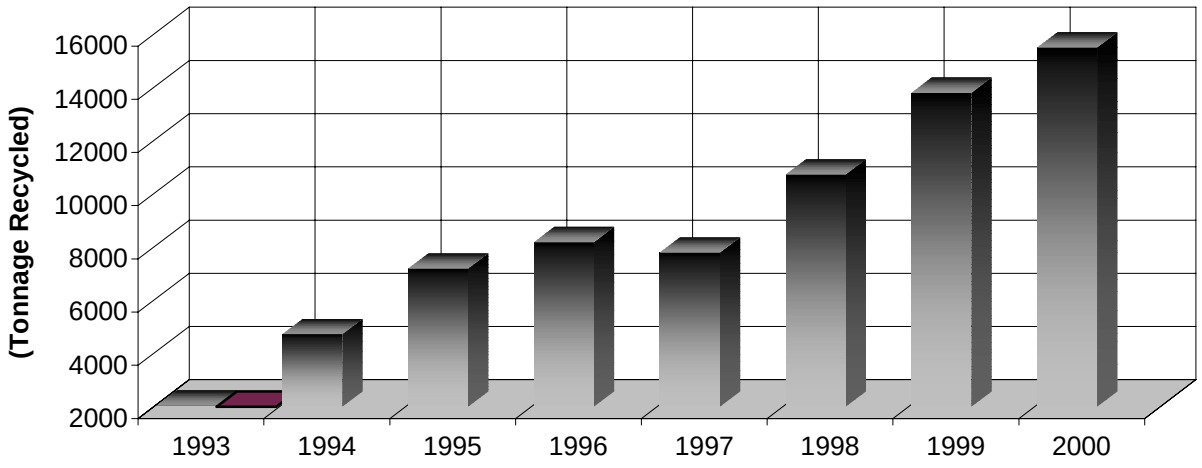
In Columbus, homeowners have the opportunity to contract privately for curbside recycling or utilize neighborhood drop-off locations. In some Franklin County locations, cities provide the service directly. In others, cities may pay for the service and contract with private companies to carry it out.

FRANKLIN COUNTY SOLID WASTE MANAGEMENT DISTRICT
WASTE REDUCTION & RECYCLING



SOURCE: Solid Waste Authority of Central Ohio

COLUMBUS TONNAGE RECYCLED



Note: *Totals reflect Residential/Municipal recycled tonnage*

SOURCE: Division of Refuse Collection

The final step in the waste management continuum is **disposal.** Here, solid waste that can't be further processed is deposited in a final "resting place." This usually means

that the material is landfilled (composting may be considered a form of processing or disposal, depending on one's interpretation).

A landfill is essentially an engineered burial site for solid waste. It may be constructed in the earth or above ground. As refuse is deposited in the landfill, special vehicles compact it so that it takes up minimal air space. The material is then covered with a layer or layers of synthetic and/or earthen material (i.e., "cover" or "cap") to keep out water.

As a solid waste burial site, landfills must be built to safely contain refuse and minimize the potential for groundwater contamination. This can occur when water percolates through the ground, first coming into contact with the decomposing refuse, and then groundwater supplies. This contaminated water is called leachate. A well-engineered and operated site can minimize the potential for groundwater contamination through the use and formation of adequate cover material; the installation of clay, plastic or composite landfill liners; and a leachate collection system. Liners are placed at the bottom of landfills as a protective barrier between the wastes and groundwater supplies. Leachate collection systems are piping mechanisms that capture and pump any accumulated water from the bottom of the landfill to treatment sites.

State legislation has mandated that Ohio counties form management districts for the efficient and effective disposal of solid waste. Such districts can be made up of multiple or single counties. Franklin County makes up its own management district -- appropriately called the Franklin County Solid Waste Management District. The Solid Waste Authority of Central Ohio (SWACO) is the governmental organization authorized by Ohio law to work with solid waste disposal issues within the Franklin County Solid Waste Management District. SWACO owns and operates the Franklin County Landfill, and had operated the Columbus Solid Waste Reduction Facility (refuse incinerator) before its closure.

The availability of landfill space is a significant concern for local officials. Many areas are geologically unsuitable for landfill construction and operation. Public concern over landfill siting may also make it difficult to find an acceptable location. In many places, these factors combine to result in a shortage of available landfill space. In some areas of the country, particularly in the Northeast, many communities must ship their wastes long distances for landfill disposal, which sharply drives up consumer costs.

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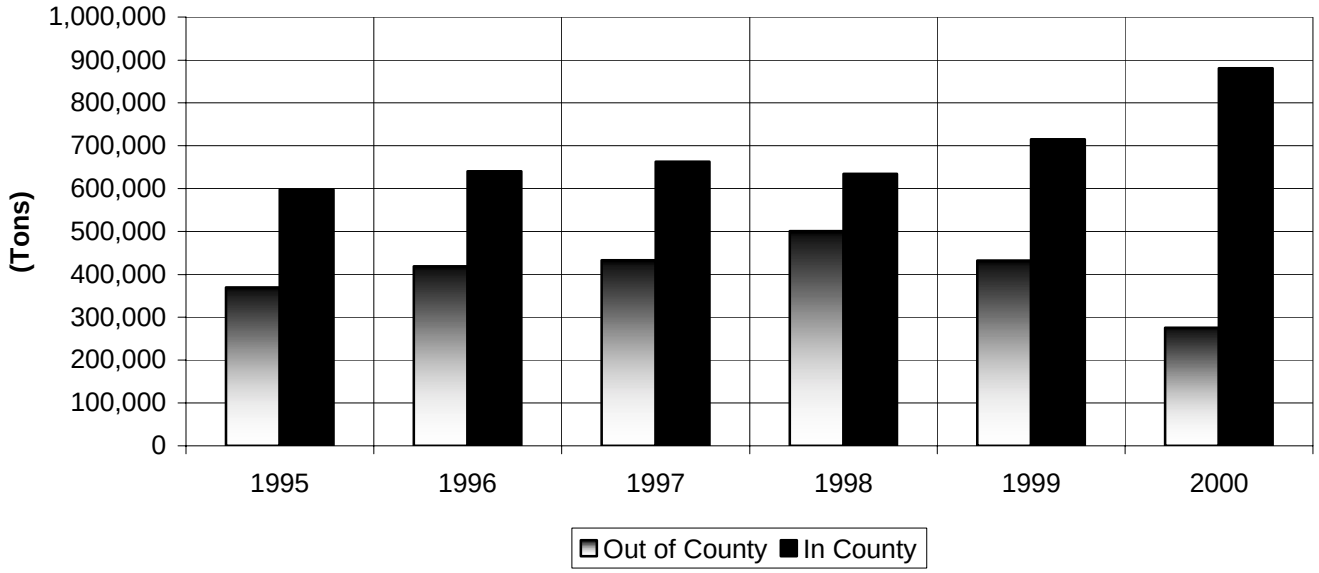
particularly in the Northeast, many communities must ship their wastes long distances for landfill disposal, which sharply drives up consumer costs.

This suggests that available landfill space be carefully conserved so that a facility's lifespan can be extended as long as possible. One way to do this is to restrict landfill operations so that facilities accept only "in-district" wastes. However, this is not always possible. Since landfills operate on the fees charged to waste haulers for the use of the facility, they are often under pressure to maximize revenues. Accordingly, both private and publicly owned landfills may sometimes accept solid waste generated "in-district" and "out-of-district."

Other facilities, like the Franklin County Landfill, accept only "in-district" wastes. However, while the facility is free to restrict the source of incoming waste, it cannot legally require that "in-district" refuse haulers transport their material to the facility. This means that individual haulers are free to use the most economical landfill site available. This may or may not be in the Franklin County Solid Waste Management District, when transportation distances and costs are considered. In fact, many haulers choose to transport solid waste to landfills located outside the district. While this may be the most economical choice for some waste haulers, many would contend that the transporting of solid waste from one community to another for disposal raises questions of environmental "fairness."

DESTINATION OF FRANKLIN COUNTY SOLID WASTE
Generated Tonnage



CONCLUSION

Clearly, the indicator information in this document cannot tell the whole story on the health of our environment. Indicators are nothing more than information; certainly there's a vast amount of information that could provide evidence of whether environmental quality is improving, declining or simply remaining constant. However, the *Snapshot's* contents can serve to provide a useful, though general, picture of the Franklin County environment.

Much of the data contained in this *Snapshot* document offers evidence of local environmental improvement. This is good news, both from a public health and quality of life perspective. Reduced environmental pollution lessens potential health threats to citizens. At the same time, community quality of life increases as aesthetics improve, recreational opportunities are more numerous and enjoyable, and peoples' worries about environmental degradation diminish.

While there may have been gains, however, it's important to realize that any advancement in environmental quality isn't permanent. Without continued effort and vigilance by government officials, local businesses and the public, these improvements could slow or be reversed.

We must also recognize that although the *Snapshot* contains some positive environmental indicators, it also highlights some areas of concern. These areas should be carefully monitored. One or two years of worrisome environmental information may be an insufficient basis for development of new policies. However, action may be warranted in instances where trend information, gathered over multiple years, suggests continued problems. Appropriate community actors must, where applicable, renew their efforts to develop, continue or strengthen policies leading to environmental improvement.

In the end, the true value of the *Environmental Snapshot* may be in providing the public with an accurate and comprehensive source of environmental information. The *Snapshot* represents a community education opportunity that can help lead to changes in individual behaviors. In some cases, this may do more than any government policy to improve the environment.

However, without a way to widely communicate and use the information, the document's publication remains only an opportunity. The Columbus Health Department has been exploring ways to bring this information to the general public's attention, and discussing possible ways in which it can be used. We encourage citizens and relevant community organizations to do the same. In this way, the *Snapshot's* potential can be fully realized as the community becomes better informed and individual or collaborative strategies are developed to further improve our environment.

NARRATIVE SOURCE MATERIAL

Groundwater: Nature's Hidden Treasure. Environment Canada. Internet address: <http://atlenv.bed.ns.doe.ca/udo/trea.html>

Ohio EPA Division of Surface Water. General Information. Internet address: <http://chagrin.epa.ohio.gov/general.html>

Waste Management Essay. American Public Works Association. Internet address: <http://www.tfs.net/apwa/waste.html>

Solstice/Sustainable Living Environment. Composting Introduction. Internet address: <http://solstice.crest.org/environment/gotwh/general/composting/html/intro.html>

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http://crest.org/environment/gotwh/general/solid/html/pubs.html>

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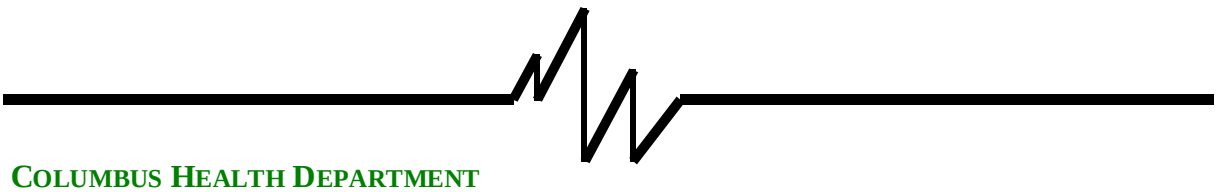

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